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VARIETY TESTS OF SUGARCANES IN LOUISIANA DURING THE CROP YEAR 1932-33

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INTRODUCTION

As a result of a coordinated program of variety breeding and testing pursued within recent years by the United States Department of Agriculture and affiliated agencies, there has been made available to sugarcane growers in the continental United States an assortment of sugarcane varieties which by reason of their superior productiveness promise to place sugarcane cultivation on a much more satisfactory basis. The chief interest in this report lies in the comparative results obtained with the new Department of Agriculture seedling C. P. 28/19,[2] which appeared in replicated plantings in comparison with standard varieties at seven representative locations in the Louisiana sugarcane district during 1933. The results fully confirm preliminary estimates based on limited tests previously conducted at the Houma station by indicating for this variety a sugar-per-ton capacity superior to that of Co. 281 and approximating that of P. O. J. 234, combined with sugar-per-acre productiveness slightly exceeding that of C. P. 807 under prevailing conditions. This report also gives data on extensive plant-cane and stubble tests of Co. 290 in comparison with other commercially grown varieties which present further evidence of the outstanding value of that variety. Co. 290 was released in the fall of 1933 for commercial culture, and because of heavy yields of cane and indicated heavy yields of sugar per acre it has attracted much attention.

[1] Acknowledgment is made to R. B. Bisland and R. L. Holmes for assistance in conducting some of the tests reported in this circular.

[2] Many varieties of sugarcane are commonly designated by letters or other abbreviations indicating the origin of the seedling cane. The meanings of such designations for the varieties mentioned throughout this circular are as follows: Co.=Coimbatore (India) seedlings; C. P.=Canal Point (Fla.) seedlings; P. O. J.=Proefstation Oost Java seedlings; P. O. J. 36-M=Mingka selection of P. O. J. 36; U. S.=U. S. Department of Agriculture best selections from Canal Point seedlings; D.=Demerara.

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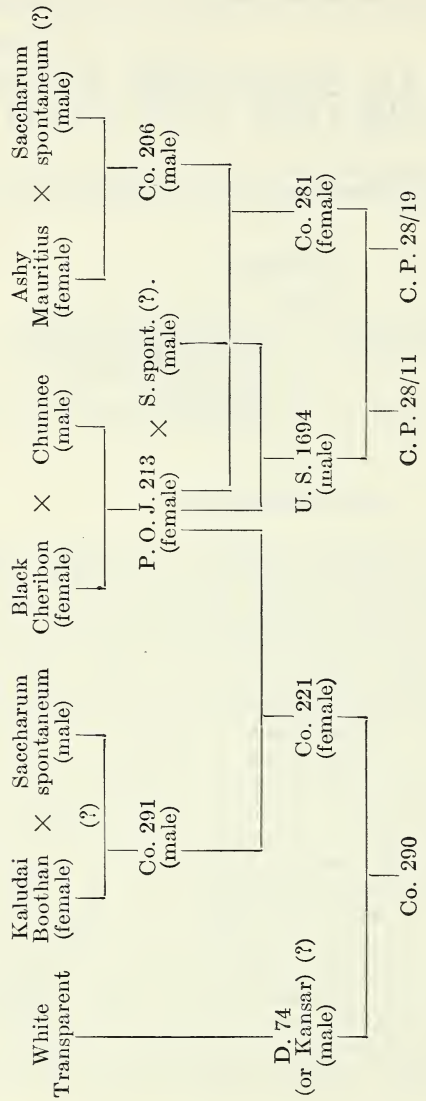
PARENTAGE OF C. P. 28/11, C. P. 28/19, AND CO. 290 [3]

The parentage of C. P. 28/11, C. P. 28/19, and Co. 290 are shown in the following genealogical table:



The varieties are species hybrids of *Saccharum officinarum*, *S. barberi*, and *S. spontaneum*. In the pedigree of C. P. 28/11 and C. P. 28/19 are the noble canes, Black Cheribon (Louisiana Purple) and Ashy Mauritius. Chunnee, a variety of *S. barberi* and *S. spontaneum*, occurs twice in the lineage. There is, however, an element of doubt

[3] Contributed by G. B. Sartoris, pathologist, Division of Sugar Plant Investigations, Bureau of Plant Industry.

in both cases because the male parents of Co. 206 and U. S. 1694 are not actually known. Since Co. 206 was one of the few vigorous, narrow-leafed forms in a large progeny of Ashy Mauritius, it was assumed to have arisen from a natural cross with *S. spontaneum* (*13*).[4] U. S. 1694 was from seed of P. O. J. 213 selfed, imported from Coimbatore, India. Its morphological and breeding characteristics, however, indicate that it possesses qualities inherited from *S. spontaneum*. It is assumed that the seed was of hybrid origin, because P. O. J. 213 is now known to be almost universally pollen sterile, and under the conditions at Coimbatore pollination by *S. spontaneum* growing nearby was possible.

Co. 290 is related to C. P. 28/11 and C. P. 28/19 through P. O. J. 213. It is also a species hybrid, but may be somewhat more removed from *Saccharum spontaneum* and Chunnee because three noble canes—Black Cheribon, Kaludai Boothan, and probably D–74—occur in the lineage. Co. 290 was obtained from the cross D–74 × Co. 221, but there existed chances for pollen of the cane Kansar, which is in the same group of Indian canes as Chunnee, reaching the mother arrow (*13*). The male parent might, therefore, have been either D–74 or Kansar. It is related to *S. spontaneum* through Co. 291, which is assumed to be a hybrid from a noble cane, Kaludai Boothan and *S. spontaneum*.

While there may be some doubt about the parentage of these hybrid canes, they have inherited essential characters from varieties that were commercially prominent in Louisiana, and from Chunnee and *Saccharum spontaneum* additional factors, thereby bringing about a new combination of characteristics, which is adapted to the environmental conditions of this section.

CHARACTERISTICS OF C. P. 28/19 AND C. P. 28/11

C. P. 28/19 has proved among the earliest of varieties studied in point of germination, but usually suckers very sparingly. While under certain conditions the latter characteristic has resulted in inadequate stands it may possibly prove advantageous by reducing excessive physical losses encountered in the case of varieties giving a profusion of suckers, growth of which is eventually suppressed by older stalks. This variety makes somewhat reclining growth and has a tendency to lodge under conditions of extreme soil fertility. It has a stalk somewhat similar to that of P. O. J. 234 with generally larger diameter. In studies conducted on several thousand stalks selected at random from the plant-cane variety tests at six representative localities in Louisiana during 1933, C. P. 28/19 averaged 1.85 pounds per stalk as compared with 1.73 pounds for P. O. J. 213, 1.61 pounds for Co. 281, 1.82 pounds for C. P. 807, and 2.41 pounds for Co. 290.

C. P. 28/11 compares favorably with C. P. 28/19 in early maturity and good stubbling qualities. In experimental tests this variety has given good results but appears less suitable than C. P. 28/19 in that it has given somewhat lower yields of sugar per ton of cane and of cane per acre, that its stalk diameter is smaller than that of P. O. J. 234, and that it is more susceptible to windstorm damage. While C. P. 28/11 appears of lesser commercial promise than C. P. 28/19, it is believed that it will prove suitable for commercial culture, at least in a temporary role, as an early-season variety.

[4] Italic numbers in parentheses refer to Literature Cited, p. 34.

In general vigor and in reaction to diseases prevalent in Louisiana C. P. 28/11 and C. P. 28/19 appear superior to the P. O. J. varieties now grown commercially, but inferior to C. P. 807. The following statements concerning the disease reaction of these varieties are taken from a recent article by Brandes and others (*5*):

C. P. 28/11 (unreleased seedling from the cross Co. 281 × U. S. 1694) is apparently immune from mosaic,[5] very resistant to red rot and moderately resistant to root diseases. It is susceptible to sheath rot (discussed below). Its small stalk diameter combined with long and soft tops make it particularly subject to storm damage.

C. P. 28/19 (unreleased seedling from the cross Co. 281 × U. S. 1694) shows great promise by its moderate resistance toward red rot and probable tolerance of mosaic. However, one stool at the Houma station became infected with mosaic and the disease has persisted in all shoots produced from cuttings from this stool, thus differing somewhat from tolerant varieties like P. O. J. 36–M and 213 in which a portion of the shoots usually come up with no evidence of mosaic. It is apparently more resistant toward root rot than Co. 281 but much less so than C. P. 807 and Co. 290 which was brought out clearly by black land comparisons during the unfavorable weather of the past year. C. P. 28/19 has unfortunately proven rather susceptible to Sheath-rot (*Cytospora sacchari*), a disease that is so uncommon on commercial varieties it has probably not been noticed by most planters. Its name comes from the reddening and rotting of leaf sheaths, but its principal effect is in suppressing development of the suckers which later, when brown and dead, become covered with spinelike fruiting bodies of the fungus. One plot of first stubble C. P. 28/19 at the Houma station showed in August, 1933, 14.7 percent and a second stubble plot 38 percent of the shoots infected. One plot excessively fertilized with nitrogen showed only 11 percent infection. However, since more shoots are always produced than develop into stalks, such figures are unreliable and, in fact, thus far it has been impossible to estimate the probable damage from this disease.

SEASONAL CONDITIONS

Weather conditions during the winter of 1932–33 proved unfavorable to the satisfactory overwintering of both plant cane and stubble. An extremely early freeze on November 13, when a minimum temperature of 27° F. was recorded at the United States Sugar-Plant Field Station at Houma, killed practically all young cane growth to the ground, thus greatly extending the period of semidormancy during which agencies of deterioration are most active. In addition, adventitious growth during the winter period was repeatedly killed back by numerous freezes. Within the period between November 12 and February 12, temperatures of 32°, or lower, were recorded on 16 different dates at Houma. Among the latter was included the unusually low temperature of 20° F. on February 9. Predominantly cool weather during the early spring months of 1933 retarded the growth of sugarcane, and the resulting growth deficiency was accentuated by comparatively dry weather during May and June which, in certain localities, amounted to a serious drought, as shown by the rainfall data for the Louisiana sugarcane district in table 1. On several of the larger plantations irrigation was attempted by improvised methods, the results of which were on the whole considered negative, although in certain instances apparently favorable and economically justifiable results were obtained. The general opinion was that irrigation operations were in almost all cases started too late to afford the optimum results.

[5] Shortly after the date on which the article appeared the authors advised the writers of this circular that in May 1934 mosaic was discovered in several stools of this variety which had previously remained entirely free from the disease.

TABLE 1.—*Amount and distribution of rainfall at 6 sugarcane test fields in Louisiana, 1933*

Station	January		February		March		April		May		June		July	
	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches
Albania	2	2.41	9	8.60	5	7.48	5	5.09	4	5.35	4	6.85	8	12.74
Alma	6	11.25	4	4.75	4	5.65	6	8.25	4	4.75	3	3.50	8	5.25
Oaklawn	6	2.25	11	5.70	6	7.65	6	4.65	2	1.60	2	1.35	16	9.40
Raceland	7	3.92	10	5.66	7	7.45	8	6.72	5	2.20	3	3.55	12	7.56
Greenwood	4	3.23	7	5.22	6	7.18	6	5.51	5	3.75	4	2.90	12	6.26
Houma	9	4.45	11	5.34	6	11.90	8	3.88	5	3.53	2	1.99	15	10.71
Normal for Houma [1]	----	4.02	----	4.37	----	3.70	----	3.89	----	3.83	----	6.05	----	8.56

Station	August		September		October		November		December		Total	
	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches
Albania	12	9.43	4	2.07	2	1.40	3	2.45	5	6.26	63	70.13
Alma	5	4.75	3	4.75	3	4.25	2	3.25	5	5.00	53	65.40
Oaklawn	10	3.70	7	4.30	3	1.45	5	.95	2	1.60	76	44.60
Raceland	8	5.51	1	1.00	4	3.44	5	2.22	5	2.70	75	51.93
Greenwood	5	2.35	4	1.90	5	2.80	5	1.54	6	1.88	69	44.52
Houma	9	4.05	9	3.25	4	4.13	3	3.64	3	2.58	84	59.45
Normal for Houma [1]	------	7.21	------	5.65	------	4.07	------	3.76	------	4.81	------	59.92

[1] Average precipitation during period 1888 to 1930, inclusive (*12*).

Conditions during the harvesting months were rendered exceedingly favorable by the comparatively low rainfall, which interfered very little with harvesting operations, and by the absence of any freezing temperature during the entire period. The steady progress of maturity up to the end of harvesting operations resulted in average sugar recoveries considerably above normal, despite the fact that harvesting operations were begun with comparatively immature cane.

EXPERIMENTAL METHODS

Plot technic and the method of statistical interpretation employed were discussed in a previous publication (*3*). Observed field yields are based on weights obtained from plots of one-fortieth of an acre distributed over the area of the experiment in the usual checkerboard arrangement and randomized with two-way Latin-square restrictions. Except where otherwise specified, each experiment involved two Latin squares; thus the number of replications usually equaled twice the number of varieties involved. Fisher's analysis of variance method (*7*) was employed throughout, the results of which are shown in terms of differences corresponding to the two accepted levels of statistical significance, namely, $P=0.05$, and $P=0.01$. A difference corresponding to $P=0.05$ may be expected as a matter of chance only 5 times out of 100, whereas one corresponding to $P=0.01$ might be expected only once out of 100.

Following cutting of the cane, as for milling purposes, a 40-stalk sample, taken at random from each individual plot, was brought to Houma for milling and analysis, thus affording a juice analysis corresponding to each individual plot. From the field and analytical data

thus obtained it was possible to compute the indicated yield of sugar per plot and per ton of cane for each replication of each variety.

The factors used in making sugar calculations were the same as previously published (*2*, *3*). With P. O. J. 213 as the standard variety, the following factors were used: Juice extraction=76 percent; reduction factor to convert laboratory-mill juice analysis to the basis of completed milling, Brix, 0.985, sucrose, 0.970; boiling-house efficiency number=100 percent; Winter-Carp formula. The indicated yield of sugar per ton of cane, as computed, applied directly to P. O. J. 213, P. O. J. 36–M, P. O. J. 234, and Co. 281. In order to make allowance for differences in milling qualities between these and other varieties, "varietal correction factors" based on results of milling studies previously published (*2*) were applied as follows to sugar yields as computed: For C. P. 807, C. P. 28/11, and C. P. 28/19, computed yield multiplied by 0.98. For Co. 290, computed yield multiplied by 1.06. These individual values formed the basis of the statistical interpretation of observed yields of sugar per ton of cane and per acre. Except where otherwise stated, the average yield of sugar per acre for each variety is based on the average of the computed yields of its individual plots. The average indicated yield of sugar per ton of cane is the weighted average of the corresponding value observed in individual plots. This corresponds exactly to the indicated yield of sugar per ton of cane computed from the average of corresponding individual plot analyses similarly weighted. In this connection it might be mentioned that the simple average of juice analyses in most cases corresponded very closely to the weighted average, as above determined.

In a few instances, particularly where a pronounced soil-fertility gradient existed, as revealed by plot weights, minor discrepancies occurred. In such cases, there was a tendency for high-yielding plots to be associated with low indicated yields of sugar per ton of cane, and vice versa, thus resulting in a negative correlation between yield of cane and indicated yield of sugar per ton of cane. It is obvious that in such cases computing the average yield of sugar per acre from the average yield of cane per acre and the simple average of juice analyses would result in a slight exaggeration. Under conditions of tests during 1933, however, the error so introduced would have been comparatively insignificant.

PLANT-CANE TESTS ON LIGHT SOIL

Detailed results of plant-cane variety tests on light soil are given in table 2. These tests involved extensive studies on six important varieties at seven widely separated localities in the Louisiana sugar-cane district, and the result may be taken as affording a good indication of the relative adaptability of the various varieties under prevailing weather conditions. The sites were selected in cooperation with A. M. O'Neal, Division of Soil Fertility, Bureau of Chemistry and Soils, United States Department of Agriculture, for uniformity and with a view of affording conditions representative of the predominant light-soil area of the particular locality. The tests were planted during the period September 29 to October 14, which corresponds roughly to the peak of planting activities on plantations. Harvest dates for individual stations, given in table 2, correspond to

the period during which much of the commercial plant-cane crop was being harvested. As previously mentioned, due to the absence of any killing freeze during the harvest period, cane in plant-cane tests, which in accordance with plantation practice was harvested late in the season, reached an unprecedented and totally unrepresentative level of maturity, thus actual indicated yields of sugar are not particularly representative. Relative yields of sugar between varieties are, of course, not subject to the same objection but, as a result of the unusual weather conditions, late-maturing varieties undoubtedly appear to better advantage than can be expected under normal conditions.

TABLE 2.—*Results of plant-cane variety tests on light soil in Louisiana during 1933*

Variety	Average acre yield [1] of cane	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
ON YAZOO VERY FINE SANDY LOAM, GODCHAUX PLANTATION, RACELAND (HARVESTED DEC. 4)							
	Tons [2]		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	18.93	16.15	13.40	82.97	187.4	3,547	10.67
P. O. J. 213	18.39	15.39	12.71	82.59	177.3	3,261	11.28
Co. 281	18.96	16.89	14.23	84.25	200.6	3,803	9.97
Co. 290	35.76	16.63	13.39	80.52	195.2	6,980	10.25
C. P. 807	25.65	15.86	13.29	83.80	183.1	4,697	10.92
C. P. 28/19	22.95	18.25	15.75	86.30	220.3	5,056	9.08
ON YAZOO VERY FINE SANDY LOAM, GREENWOOD PLANTATION, THIBODAUX (HARVESTED DEC. 6)							
P. O. J. 36–M	24.36	17.05	14.35	84.16	202.2	4,926	9.89
P. O. J. 213	26.94	16.75	14.42	86.09	205.6	5,539	9.73
Co. 281	26.97	17.81	15.38	86.36	219.6	5,923	9.11
Co. 290	40.32	16.68	13.46	80.70	196.5	7,923	10.18
C. P. 807	34.62	16.00	13.43	83.94	185.2	6,412	10.80
C. P. 28/19	27.63	19.36	17.16	88.64	243.2	6,720	8.22
ON CREVASSES SILTY CLAY LOAM,[3] UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED DEC. 15)							
P. O. J. 36–M	25.75	16.32	13.48	82.60	188.0	4,841	10.64
P. O. J. 213	23.12	16.41	14.12	86.04	201.2	4,652	9.94
P. O. J. 234	22.58	17.66	15.47	87.60	222.5	5,024	8.99
Co. 281	24.18	17.06	14.45	84.70	204.3	4,940	9.79
Co. 290	39.33	16.38	13.18	80.46	192.1	7,555	10.41
C. P. 807	31.74	16.12	13.62	84.49	188.5	5,983	10.61
C. P. 28/19	29.75	18.61	16.05	86.24	224.4	6,676	8.91
ON PHARR SILT LOAM, OAKLAWN PLANTATION, FRANKLIN (HARVESTED DEC. 11)							
P. O. J. 36–M	12.84	17.72	15.33	86.51	219.1	2,813	9.13
P. O. J. 213	11.91	16.85	14.58	86.53	208.4	2,482	9.60
Co. 281	13.95	18.13	15.70	86.60	224.5	3,132	8.91
Co. 290	25.59	18.20	15.34	84.29	229.3	5,868	8.72
C. P. 807	20.79	17.02	14.66	86.13	204.9	4,260	9.76
C. P. 28/19	15.96	19.39	17.09	88.14	241.6	3,856	8.28

TABLE 2.—*Results of plant-cane variety tests on light soil in Louisiana during 1933*—Continued

ON IBERIA SILT LOAM, ALBANIA PLANTATION, JEANERETTE (HARVESTED DEC. 14)

Variety	Average acre yield [1] of cane	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons [2]		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	23.10	17.34	14.72	84.89	208.3	4,812	9.60
P. O. J. 213	18.75	17.21	15.28	88.79	221.2	4,147	9.04
Co. 281	24.90	18.98	17.22	90.73	251.9	6,272	7.94
Co. 290	38.76	18.67	16.04	85.91	242.1	9,384	8.26
C. P. 807	30.30	17.44	15.43	88.47	218.5	6,621	9.15
C. P. 28/19	26.01	20.35	18.37	90.27	262.7	6,833	7.61
ON VERMILION SILT LOAM,[3] CALDWELL PLANTATION, ERATH (HARVESTED DEC. 8)							
P. O. J. 36–M	7.89	17.03	14.67	86.14	209.2	1,651	9.56
P. O. J. 213	10.74	17.28	15.44	89.35	224.2	2,408	8.92
Co. 281	11.79	18.15	16.04	88.37	231.7	2,732	8.63
Co. 290	18.21	18.35	15.51	84.52	232.2	4,228	8.61
C. P. 807	18.39	17.00	14.50	85.29	201.6	3,707	9.92
C. P. 28/19	15.09	19.54	17.24	88.23	243.8	3,679	8.20
ON YAZOO VERY FINE SANDY LOAM, ALMA PLANTATION, LAKELAND (HARVESTED NOV. 28)							
P. O. J. 36–M	24.09	16.88	13.49	79.92	184.7	4,449	10.83
P. O. J. 213	31.59	16.13	13.17	81.65	182.6	5,768	10.95
Co. 281	25.92	17.37	14.33	82.50	199.8	5,179	10.01
Co. 290	42.54	16.29	12.54	76.98	178.1	7,576	11.23
C. P. 807	38.07	15.12	11.61	76.79	152.2	5,794	13.14
C. P. 28/19	31.41	17.97	14.82	82.47	202.4	6,357	9.88

[1] For yield differences between varieties and their statistical significance see table 3.
[2] Tons of 2,000 pounds are used in all tests reported in this circular.
[3] Tentative classification.

While relative results were unmistakably affected in certain instances by local factors, it is interesting to note that certain well-defined trends are conspicuously shown by the results. They will be more readily appreciated by reference to table 3, in which observed differences between varieties are given. Of particular interest are the remarkable yields obtained with Co. 290. In the average of all tests, the indicated yield of sugar per acre obtained with this variety exceeded that from either P. O. J. 213 or P. O. J. 36–M by over 3,000 pounds, that from Co. 281 by over 2,500 pounds, that from C. P. 807 by over 1,700 pounds, and that from C. P. 28/19 by nearly 1,500 pounds. In this respect, it bettered the performance of P. O. J. 36–M by more than 80 percent and that of P. O. J. 213 by more than 75 percent. In the indicated yield of sugar per ton of cane, Co. 290 proved inferior to C. P. 28/19 and to Co. 281, but generally more satisfactory than P. O. J. 213, P. O. J. 36–M, and C. P. 807. In this respect, it was higher than P. O. J. 36–M in 5 cases out of 7 and higher than P. O. J. 213 in 4 cases out of 7. It was significantly higher than C. P. 807 in all tests with an average difference of over 18 pounds of sugar per ton of cane. It was significantly lower than Co. 281 in 3 cases out of 7 and in the average of all tests.

TABLE 3.—*Differences in average yields observed between sugarcane varieties in plant-cane tests on light soil at different localities in Louisiana (table 2)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Oaklawn	Albania [1]	Erath	Alma	Average of 7 tests
Co. 290	P. O. J. 213	+17.37	+13.38	+16.21	+13.68	+20.01	+7.47	+10.95	+14.15
	P. O. J. 36-M	+16.83	+15.96	+13.58	+12.75	+15.66	+10.32	+18.45	+14.79
	Co. 281	+16.80	+13.35	+15.15	+11.64	+13.86	+6.42	+16.62	+13.41
	C. P. 28/19	+12.81	+12.69	+9.58	+9.63	+12.75	+3.12	+11.13	+10.24
	C. P. 807	+10.11	+5.70	+7.59	+4.80	+8.46	−.18	+4.47	+5.85
C. P. 807	P. O. J. 213	+7.26	+7.68	+8.62	+8.88	+11.55	+7.65	+6.48	+8.30
	P. O. J. 36-M	+6.72	+10.26	+5.99	+7.95	+7.20	+10.50	+13.98	+8.94
	Co. 281	+6.69	+7.65	+7.56	+6.84	+5.40	+6.60	+12.15	+7.56
	C. P. 28/19	+2.70	+6.99	+1.99	+4.83	+4.29	+3.30	+6.66	+4.39
C. P. 28/19	P. O. J. 213	+4.56	+.69	+6.63	+4.05	+7.26	+4.35	−.18	+3.91
	P. O. J. 36-M	+4.02	+3.27	+4.00	+3.12	+2.91	+7.20	+7.32	+4.55
	Co. 281	+3.99	+.66	+5.57	+2.01	+1.11	+3.30	+5.49	+3.16
Co. 281	P. O. J. 213	+.57	+.03	+1.06	+2.04	+6.15	+1.05	−5.67	+.75
	P. O. J. 36-M	+.03	+2.61	−1.57	+1.11	+1.80	+3.90	+1.83	+1.39
P. O. J. 213	P. O. J. 36-M	−.54	+2.58	−2.63	−.93	−4.35	+2.85	+7.50	+.64
Difference for P=0.05		±2.77	±2.41	±1.64	±1.55	±4.86	±3.64	±2.91	±2.24
Difference for P=0.01		±3.71	±3.23	±2.18	±2.07	±6.73	±4.94	±3.90	±3.02

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS)[2]

C. P. 28/19	C. P. 807	+37.2	+58.0	+35.9	+36.7	+44.2	+42.2	+50.2	+44.3
	P. O. J. 213	+43.0	+37.6	+23.2	+33.2	+41.5	+19.6	+19.8	+32.3
	P. O. J. 36-M	+32.9	+41.0	+36.4	+22.5	+54.4	+34.6	+17.7	+34.7
	Co. 290	+25.1	+46.7	+32.3	+12.3	+20.6	+11.6	+24.3	+26.2
	Co. 281	+19.7	+23.6	+20.1	+17.1	+10.8	+12.1	+2.6	+14.1
Co. 281	C. P. 807	+17.5	+34.4	+15.8	+19.6	+33.4	+30.1	+47.6	+30.2
	P. O. J. 213	+23.3	+14.0	+3.1	+16.1	+30.7	+7.5	+17.2	+18.2
	P. O. J. 36-M	+13.2	+17.4	+16.3	+5.4	+43.6	+22.5	+15.1	+20.6
	Co. 290	+5.4	+23.1	+12.2	−4.8	+9.8	−.5	+21.7	+12.1
Co. 290	C. P. 807	+12.1	+11.3	+3.6	+24.4	+23.6	+30.6	+25.9	+18.1
	P. O. J. 213	+17.9	−9.1	−9.1	+20.9	+20.9	+8.0	−4.5	+6.1
	P. O. J. 36-M	+7.8	−5.7	+4.1	+10.2	+33.8	+23.0	−6.6	+8.5
P. O. J. 213	do	−10.1	+3.4	+13.2	−10.7	+12.9	+15.0	−2.1	+2.4
P. O. J. 36-M	C. P. 807	+4.3	+17.0	−.5	+14.2	−10.2	+7.6	+32.5	+9.6
P. O. J. 213	do	−5.8	+20.4	+12.7	+3.5	+2.7	+22.6	+30.4	+12.0
Difference for P=0.05		±9.61	±2.59	±5.25	±5.31	±15.29	±5.43	±5.02	±8.91
Difference for P=0.01		±12.86	±3.47	±6.98	±7.10	±21.18	±7.38	±6.72	±12.02

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)

Co. 290	P. O. J. 213	+3,719	+2,384	+2,903	+3,386	+5,237	+1,820	+1,808	+3,037
	P. O. J. 36-M	+3,433	+2,997	+2,714	+3,055	+4,572	+2,577	+3,127	+3,211
	Co. 281	+3,177	+2,000	+2,615	+2,736	+3,112	+1,496	+2,397	+2,505
	C. P. 807	+2,283	+1,511	+1,572	+1,608	+2,763	+521	+1,782	+1,720
	C. P. 28/19	+1,924	+1,203	+879	+2,012	+2,551	+549	+1,219	+1,477
C. P. 28/19	P. O. J. 213	+1,795	+1,181	+2,024	+1,374	+2,686	+1,271	+589	+1,560
	P. O. J. 36-M	+1,509	+1,794	+1,835	+1,043	+2,021	+2,028	+1,908	+1,734
	Co. 281	+1,253	+797	+1,736	+724	+561	+947	+1,178	+1,028
	C. P. 807	+359	+308	+693	−404	+212	−28	+563	+243
C. P. 807	P. O. J. 213	+1,436	+873	+1,331	+1,778	+2,474	+1,299	+26	+1,317
	P. O. J. 36-M	+1,150	+1,486	+1,142	+1,447	+1,809	+2,056	+1,345	+1,491
	Co. 281	+894	+489	+1,043	+1,128	+349	+975	+615	+785
Co. 281	P. O. J. 213	+542	+384	+288	+650	+2,125	+324	−589	+532
	P. O. J. 36-M	+256	+997	+99	+319	+1,460	+1,081	+730	+706
P. O. J. 213	do	−286	+613	−189	−331	−665	+757	+1,319	+174
Difference for P=0.05		±549	±465	±294	±357	±1,051	±805	±516	±501
Difference for P=0.01		±735	±624	±390	±480	±1,456	±1,093	±690	±676

[1] Average yields at this station based on only 4 replications. [2] Averages of the 7 tests are weighted.

This variety again demonstrated its superior vigor by significantly outyielding all other varieties in cane per acre at 6 out of 7 stations and in the average of all tests. Its superiority to C. P. 807 in this respect, which in the average was reflected by a difference of 5.85 tons, was positive in all cases, except at Erath, where its yield was slightly under that of C. P. 807. Relatively speaking, it gave best results at Raceland, Oaklawn, and Albania, where its indicated yield of sugar per acre was in each case over twice as large as the corresponding yield from P. O. J. 213.

The results obtained with C. P. 28/19 fully confirm tentative evaluation of this variety based on preliminary tests previously conducted at the Houma field station. Under the conditions, its superiority in sucrose content to Co. 281, its nearest competitor in the group, is plainly evidenced by the consistently larger indicated yields of sugar per ton of cane, the difference being definitely significant in 5 cases out of 7 and in the average of all tests, amounting in the latter case to over 14 pounds. C. P. 28/19 proved definitely superior to C. P. 807, P. O. J. 213, P. O. J. 36–M, and Co. 290 with regard to indicated yield of sugar per ton of cane in all tests, the average difference ranging from over 44 pounds as compared to C. P. 807, to over 26 pounds as compared to Co. 290. The results of these tests definitely place C. P. 28/19 between C. P. 807 and Co. 281 in yield of cane per acre with an average difference of 3.16 tons in its favor in comparison with Co. 281 and of 4.39 tons in the opposite direction in comparison with C. P. 807. It was significantly under C. P. 807 and significantly higher than Co. 281 in 4 cases out of 7 and in the average of all tests. It proved likewise generally superior to P. O. J. 213 with an average difference of 3.91 tons per acre and also to P. O. J. 36–M with an average difference of 4.55 tons per acre.

The consistently large indicated yield of sugar per ton of cane obtained with C. P. 28/19 placed its indicated yield of sugar per acre on the average second only to that of Co. 290. In this respect, it was significantly higher than C. P. 807 at Houma and Alma and significantly lower at Oaklawn, though the average difference of 243 pounds of sugar per acre in favor of C. P. 28/19 cannot be regarded as highly significant. Its indicated yield of sugar per acre was consistently and, for the most part, significantly greater than the corresponding one from either Co. 281, P. O. J. 213, or P. O. J. 36–M at all stations, exceeding that of Co. 281 by an average difference of over 1,000 pounds, that of P. O. J. 213 by over 1,500 pounds, and that of P. O. J. 36–M by over 1,700 pounds.

C. P. 807 again showed its previously demonstrated superiority to Co. 281, P. O. J. 36–M, and P. O. J. 213 in yield of cane per acre. Its indicated yield of sugar per ton of cane was on the average lower than that of either P. O. J. 36–M or P. O. J. 213 with a significant average difference of 12 pounds as compared with P. O. J. 213 and the somewhat questionably significant difference of 9.6 as compared with P. O. J. 36–M. This variety in line with previous observations afforded cane of comparatively low milling value on Alma plantation, where its indicated yield of 152.2 pounds of sugar per ton of cane, while satisfactory, was over 32 pounds below corresponding yields from P. O. J. 36–M and more than 30 pounds below that observed with P. O. J. 213. C. P. 807 consistently outyielded Co. 281, P. O. J. 213, and P. O. J. 36–M in indicated yield of sugar per acre with an average difference of nearly 800 pounds as compared with Co. 281, over 1,300 pounds as compared with P. O. J. 213, and nearly 1,500 pounds as compared with P. O. J. 36–M, all of which are statistically significant.

Co. 281 afforded on the whole yields of cane per acre not significantly different from corresponding ones of either P. O. J. 213 or P. O. J. 36–M, but showed a slight though insignificant average advantage over each one. It showed, however, its usual superiority to these two varieties in indicated yield of sugar per ton of cane,

which was consistent throughout and reached the proportions of significance in 13 out of 14 comparisons involved, the difference averaging over 18 pounds as compared with P. O. J. 213 and over 20 pounds as compared with P. O. J. 36–M. In indicated yield of sugar per acre, Co. 281 proved generally superior to either P. O. J. 213 or P. O. J. 36–M with an average difference of 532 pounds as compared with P. O. J. 213 and 706 pounds as compared with P. O. J. 36–M, both of which may be regarded as statistically significant. This variety gave the best relative results at Albania and the poorest at Raceland and Oaklawn. P. O. J. 213 and P. O. J. 36–M proved consistently among the least-desirable varieties in point of indicated yield of cane per acre and were likewise among the lowest in indicated yield of sugar per ton of cane. There appears to be very little difference in desirability between these two varieties with no well defined sectional trends, but whatever difference might exist appears to be slightly in favor of P. O. J. 213. In individual tests, the latter was significantly higher than P. O. J. 36–M as to indicated yield of sugar per ton of cane at Houma and Erath, while the opposite was true at Raceland and Oaklawn.

PLANT-CANE TESTS ON HEAVY SOIL

Results of plant-cane variety tests on Sharkey clay and soils of similar agricultural properties at six representative localities are given in tables 4 and 5. These tests were planted over the same period as were the previously mentioned ones on light soil (table 2) on uniform soil areas selected in the manner described. Dates of harvest ranged from November 29 to December 15 and corresponded roughly to the period during which plant cane on such areas was being harvested on plantations.

TABLE 4.—*Results of plant-cane variety tests on heavy soil in Louisiana during 1933*

TESTS ON SHARKEY CLAY, GODCHAUX PLANTATION, RACELAND
(HARVESTED DEC. 5)

Variety	Average acre yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 234	17.07	18.63	16.42	88.14	236.8	4,042	8.45
Co. 281	16.95	17.89	15.18	84.85	214.8	3,641	9.31
Co. 290	29.70	17.21	14.10	81.93	207.6	6,166	9.63
C. P. 807	24.60	16.63	13.93	83.76	191.9	4,721	10.42

TESTS ON SHARKEY CLAY, GREENWOOD PLANTATION, THIBODAUX
(HARVESTED DEC. 7)

P. O. J. 234	15.45	18.06	15.76	87.26	226.2	3,495	8.84
Co. 281	18.90	17.52	14.70	83.90	206.8	3,909	9.67
Co. 290	29.28	16.67	13.38	80.26	194.7	5,701	10.27
C. P. 807	25.41	16.08	13.31	82.77	182.2	4,630	10.98

TESTS ON SHARKEY CLAY, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA
(HARVESTED DEC. 14)

P. O. J. 234	15.32	18.43	16.60	90.07	242.0	3,706	8.27
Co. 281	16.39	17.64	15.36	87.07	220.2	3,609	9.08
Co. 290	26.78	17.66	15.17	85.90	229.0	6,133	8.73
C. P. 807	23.10	16.92	14.75	87.17	207.3	4,789	9.65
C. P. 28/19	21.49	19.33	17.08	88.36	241.8	5,196	8.27

TABLE 4.—*Results of plant-cane variety tests on heavy soil in Louisiana during 1933*—Continued

TESTS ON BERWICK[2] CLAY, OAKLAWN PLANTATION, FRANKLIN (HARVESTED DEC. 15)

Variety	Average acre yield of cane[1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 234	11.10	17.92	15.77	88.00	227.3	2,523	8.80
Co. 281	15.30	18.04	15.52	86.03	221.2	3,384	9.04
Co. 290	23.91	17.60	14.73	83.69	219.3	5,243	9.12
C. P. 807	20.82	16.87	14.43	85.54	200.9	4,183	9.96

TESTS ON IBERIA SILTY CLAY LOAM, ALBANIA PLANTATION, JEANERETTE (HARVESTED DEC. 15)

P. O. J. 234	11.25	18.64	17.07	91.58	250.7	2,820	7.98
Co. 281	14.91	18.30	16.47	90.00	240.0	3,578	8.33
Co. 290	25.71	18.35	15.83	86.27	239.5	6,158	8.35
C. P. 807	21.60	17.33	15.29	88.23	216.2	4,670	9.25

TESTS ON SHARKEY CLAY, ALMA PLANTATION, LAKELAND (HARVESTED NOV. 29

P. O. J. 234	12.30	17.43	14.91	85.54	211.9	2,606	9.44
Co. 281	7.83	17.78	14.91	83.86	209.7	1,642	9.54
Co. 290	21.60	16.62	13.08	78.70	188.2	4,065	10.63
C. P. 807	15.96	16.01	13.01	81.26	176.3	2,814	11.34

[1] For yield differences between varieties and their statistical significance see table 5.
[2] Tentative classification.

TABLE 5.—*Differences in average yields observed between sugarcane varieties in plant-cane tests on heavy soil at different localities in Louisiana (table 4)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Oaklawn	Albania	Alma	Average of 6 tests
Co. 290	C. P. 807	+5.10	+3.87	+3.68	+3.09	+4.11	+5.64	+4.25
	Co. 281	+12.75	+10.38	+10.39	+8.61	+10.80	+13.77	+11.12
C. P. 807	P. O. J. 234	+12.63	+13.83	+11.46	+12.81	+14.46	+9.30	+12.41
	Co. 281	+7.65	+6.51	+6.71	+5.52	+6.69	+8.13	+6.87
Co. 281	P. O. J. 234	+7.53	+9.96	+7.78	+9.72	+10.35	+3.66	+8.17
Difference for P=0.05	do	−.12	+3.45	+1.07	+4.20	+3.66	−4.47	+1.30
Difference for P=0.01		±1.63	±2.30	±1.76	±3.98	±2.24	±2.75	±2.04
		±2.25	±3.19	±2.47	±5.52	±3.51	±3.81	±2.83

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS)[1]

P. O. J. 234	Co. 281	+22.0	+19.4	+21.7	+6.1	+10.7	+2.2	+13.8
	Co. 290	+29.2	+31.5	+12.9	+8.0	+11.2	+23.7	+19.5
	C. P. 807	+45.1	+44.0	+34.6	+26.4	+34.5	+35.6	+36.4
Co. 281	Co. 290	+7.2	+12.1	−8.8	+1.9	+.5	+21.5	+5.7
	C. P. 807	+23.1	+24.6	+12.9	+20.3	+23.8	+33.4	+22.6
Co. 290	do	+15.9	+12.5	+21.7	+18.4	+23.3	+11.9	+16.9
Difference for P=0.05		±3.24	±7.13	±8.15	±4.05	±9.68	±7.67	±7.07
Difference for P=0.01		±4.48	±9.88	±11.41	±5.60	±14.65	±10.62	±9.79

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)

Co. 290	C. P. 807	+1,445	+1,071	+1,344	+1,060	+1,488	+1,251	+1,277
	P. O. J. 234	+2,124	+2,206	+2,427	+2,720	+3,338	+1,459	+2,379
C. P. 807	Co. 281	+2,525	+1,792	+2,524	+1,859	+2,580	+2,423	+2,284
	P. O. J. 234	+679	+1,135	+1,083	+1,660	+1,850	+208	+1,102
	Co. 281	+1,080	+721	+1,180	+799	+1,092	+1,172	+1,007
P. O. J. 234	do	+401	−414	+97	−861	−758	+964	−95
Difference for P=0.05		±347	±539	±440	±899	±626	±544	±423
Difference for P=0.01		±481	±746	±616	±1,245	±948	±753	±599

[1] Averages of the 6 tests are weighted.

In line with previous observations, C. P. 807 and Co. 290 continue to demonstrate very satisfactory adaptability to these "black lands" of the Louisiana sugarcane district by producing yields of cane and indicated yields of sugar per acre equal or superior to the yields from the P. O. J. varieties on the better agricultural areas. Under these very adverse conditions, Co. 290 gave yields of cane per acre ranging from over 21 to nearly 30 tons and averaging slightly over 26 tons. Corresponding yields from C. P. 807 were consistently and, in 5 out of 6 cases, significantly under those obtained with Co. 290, the average difference being in excess of 4 tons.

Indicated yields of sugar per ton of cane obtained from Co. 290 were in all cases significantly higher than corresponding yields from C. P. 807 with an average difference of 17 pounds, thus giving the former variety a significant advantage in indicated yield of sugar per acre with an average difference of nearly 1,300 pounds. Observed yields of cane and indicated yields of sugar per acre obtained from Co. 281 and P. O. J. 234 were in all cases lower than corresponding ones from either C. P. 807 or Co. 290. Co. 281 showed a slight but insignificant advantage over P. O. J. 234 in yield of cane per acre which was not consistently maintained in all cases.

Comparatively speaking, the most unsatisfactory results with P. O. J. 234 were obtained at Oaklawn and Albania and with Co. 281 on Alma plantation. The comparatively low average yield of cane per acre obtained with these two varieties and particularly the excessively low ones obtained in certain instances (approximately, 11 tons with P. O. J. 234 on Oaklawn and Albania and under 8 tons with Co. 281 on Alma plantation) indicate that these varieties are of questionable adaptability on such soil areas. This is particularly true in view of the anticipated drop in yields in subsequent stubble crops. C. P. 28/19 in a single test on Sharkey clay at Houma yielded at the rate of 1.61 tons of cane per acre under the corresponding yield from C. P. 807, a difference which cannot be regarded as entirely significant. In line with the trend observed in comparative tests on light soil, its superiority to C. P. 807 in indicated yield of sugar per ton of cane, which in this case resulted in a difference of over 34 pounds, placed its indicated yield of sugar per acre over 400 pounds higher than that of C. P. 807. It is interesting to note that in this particular case, the indicated yield of sugar per ton of cane observed from C. P. 28/19 was almost identical to that observed with P. O. J. 234.

C. P. 28/19 COMPARED WITH P. O. J. 234

Ever since the introduction of the P. O. J. varieties into Louisiana, the low yielding and poor stubbling qualities of the variety P. O. J. 234 have been regarded as necessary evils because of the variety's one redeeming feature of early maturity, not found with other commercially cultivated varieties. Preliminary observations conducted during 1931 and 1932 indicated that C. P. 28/19, which apparently possesses growth, stubbling, and disease-resistant qualities on the whole quite superior to those of the P. O. J. varieties, might be a satisfactory cane for early milling. The direct and indirect comparisons between this variety and P. O. J. 234 in indicated yield of sugar per ton of cane, given in table 6, are therefore of considerable interest.

TABLE 6.—*Direct and indirect comparisons of indicated yields of sugar per ton of cane obtained with P. O. J. 234 and C. P. 28/19 in plant-cane tests in Louisiana during 1933*

Station	Increase of C. P. 28/19 over P. O. J. 234	Increase of C. P. 28/19 over Co. 281 [1]	Increase of P. O. J. 234 over Co. 281 [2]
	Pounds	*Pounds*	*Pounds*
Raceland	----------	19.7	22.0
Greenwood	----------	23.6	19.4
Houma (light soil)	1.9	20.1	18.2
Houma (heavy soil)	—.1	21.6	21.7
Oaklawn	----------	17.1	6.1
Albania	----------	10.8	10.7
Alma	----------	2.6	2.2
Average [3]	.9	16.5	14.3

[1] Tests on light soil except where otherwise specified.
[2] Tests on heavy soil except where otherwise specified.
[3] Simple average.

While direct comparisons between P. O. J. 234 and C. P. 28/19 are available in only two tests (light and heavy soil tests at Houma), indirect comparisons are available in six cases through Co. 281 as control. C. P. 28/19 appears in all light-soil tests in direct comparison with Co. 281, while P. O. J. 234 and Co. 281 were included in six tests on heavy soil planted during the same period. As will be noted by reference to table 6, in each of two direct comparisons, C. P. 28/19 gave indicated yields of sugar per ton of cane approximately equal to those of P. O. J. 234, with a slight average advantage in favor of C. P. 28/19. This trend is definitely borne out by comparative yields obtained with C. P. 28/19 and Co. 281 in light-soil tests and those obtained with P. O. J. 234 and Co. 281 in nearby tests on heavy soil. At all localities, a generally similar advantage over Co. 281 was maintained by both C. P. 28/19 and P. O. J. 234, the average difference in comparisons involving Co. 281 and C. P. 28/19 being 16.5 pounds, as compared with an average difference of 14.3 in comparisons between P. O. J. 234 and Co. 281. Thus, C. P. 28/19 appears to be at least the equal of P. O. J. 234 in indicated yield of sugar per ton of cane. While it is true that all the above tests were harvested during the latter part of the grinding season and do not strictly constitute a test as to earliness of maturity, relative yields observed late in the season were usually closely correlated with earlier ones. Furthermore, less extensive comparative tests of P. O. J. 234 and C. P. 28/19 conducted during the early fall were generally in very good relative agreement with the above ones.

FIRST-STUBBLE TESTS ON LIGHT SOIL

Results of first-stubble variety tests on light soil from plots which served for plant-cane tests during the crop year 1931–32 (*3*) are given in tables 7 and 8. Again, the outstanding vigor of C. P. 807 and Co. 290 in comparison with Co. 281 and the commercially cultivated P. O. J. varieties is conclusively demonstrated by differences in yield of cane per acre, which are definitely significant in all cases, with average differences ranging between approximately 12 and 15 tons. In the observed average difference of 1.49 tons of cane per acre, Co. 290 did not show the extent of yield superiority over C. P. 807 revealed

in the plant-cane crop during 1932, when the average difference in favor of Co. 290 was in excess of 4½ tons. The fact that Co. 290 significantly outyielded C. P. 807 in cane per acre at the three eastern test fields (Raceland, Greenwood, and Houma) and that at the western test fields (Oaklawn, Midway, Albania, and Erath) cane yields obtained with Co. 290 were either approximately equal to or significantly lower than corresponding ones from C. P. 807, may reflect an important adaptability trend with regard to these two varieties.

TABLE 7.—*Results of first-stubble variety tests on light soil in Louisiana during 1933*

TESTS ON YAZOO VERY FINE SANDY LOAM, GODCHAUX PLANTATION, RACELAND (HARVESTED NOV. 20)

Variety	Average acre-yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	17.39	16.90	14.44	85.44	205.1	3,567	9.75
P. O. J. 213	17.06	16.98	14.89	87.69	214.2	3,654	9.34
P. O. J. 234	15.74	18.29	16.37	89.50	237.9	3,745	8.41
Co. 281	19.37	18.06	15.92	88.15	229.6	4,447	8.71
Co. 290	32.21	17.65	15.05	85.27	226.3	7,289	8.84
C. P. 807	27.55	16.69	14.47	86.70	202.9	5,590	9.86

TESTS ON YAZOO VERY FINE SANDY LOAM, GREENWOOD PLANTATION, THIBODAUX (HARVESTED NOV. 23)

P. O. J. 36–M	20.22	16.23	13.46	82.93	188.2	3,805	10.63
P. O. J. 213	26.33	16.36	13.88	84.84	196.4	5,171	10.18
P. O. J. 234	20.46	17.62	15.35	87.12	220.1	4,503	9.09
Co. 281	25.78	17.26	14.85	86.04	211.6	5,455	9.45
Co. 290	38.98	16.54	13.40	81.02	196.0	7,640	10.20
C. P. 807	32.49	15.92	13.41	84.23	185.2	6,017	10.80

TESTS ON YAZOO VERY FINE SANDY LOAM, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED NOV. 20)

P. O. J. 36–M	26.29	15.78	12.60	79.85	172.5	4,535	11.59
P. O. J. 213	23.61	16.21	13.60	83.90	191.3	4,517	10.45
P. O. J. 234	22.22	17.24	14.75	85.56	209.6	4,657	9.54
Co. 281	25.97	17.23	14.45	83.87	203.2	5,277	9.84
Co. 290	38.91	16.85	13.62	80.83	199.0	7,743	10.05
C. P. 807	35.48	15.94	13.33	83.63	183.4	6,507	10.91

TESTS ON PHARR SILT LOAM,[2] OAKLAWN PLANTATION, FRANKLIN (HARVESTED NOV. 5)

P. O. J. 36–M	12.00	16.20	13.21	81.54	183.0	2,196	10.93
P. O. J. 213	11.70	15.36	12.47	81.18	172.3	2,016	11.61
P. O. J. 234	11.40	17.22	14.55	84.49	205.4	2,342	9.74
Co. 281	21.00	17.39	14.89	85.62	211.7	4,446	9.45
Co. 290	26.70	17.42	14.39	82.61	212.8	5,682	9.40
C. P. 807	30.90	15.97	13.24	82.91	181.4	5,605	11.03

TESTS ON IBERIA SILT LOAM,[2] ALBANIA PLANTATION, JEANERETTE (HARVESTED NOV. 14)

P. O. J. 36–M	16.11	16.12	13.02	80.77	179.4	2,890	11.15
P. O. J. 213	15.99	16.13	13.53	83.88	190.3	3,043	10.51
P. O. J. 234	14.31	17.56	14.96	85.19	212.1	3,035	9.43
Co. 281	20.01	17.90	15.49	86.54	221.4	4,430	9.03
Co. 290	29.19	18.03	14.84	82.31	219.0	6,393	9.13
C. P. 807	28.26	16.60	13.80	83.13	189.3	5,350	10.57

TABLE 7.—*Results of first-stubble variety tests on light soil in Louisiana during 1933*—Continued

TESTS ON ST. MARY SILT LOAM,[2] MIDWAY PLANTATION, BAYOU SALE (HARVESTED NOV. 6)

Variety	Average acre-yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	10.50	14.42	10.70	74.20	140.1	1,471	14.28
P. O. J. 213	11.10	14.59	11.24	77.04	150.7	1,673	13.27
P. O. J. 234	8.70	15.80	12.74	80.63	175.4	1,526	11.40
Co. 281	12.90	15.22	11.83	77.73	159.4	2,056	12.55
Co. 290	21.00	15.62	11.79	75.48	165.4	3,473	12.09
C. P. 807	22.80	13.89	10.36	74.59	133.4	3,042	14.99

TESTS ON VERMILION SILT LOAM,[2] CALDWELL PLANTATION, ERATH (HARVESTED NOV. 17)

P. O. J. 36–M	9.00	16.89	13.88	82.18	193.1	1,738	10.36
P. O. J. 213	11.80	16.85	14.32	84.99	202.8	2,393	9.86
P. O. J. 234	8.30	18.25	15.84	86.79	226.7	1,882	8.82
Co. 281	10.05	18.26	15.79	86.47	225.6	2,267	8.87
Co. 290	22.55	18.07	14.76	81.68	216.9	4,891	9.22
C. P. 807	22.90	15.74	12.69	80.62	171.2	3,920	11.68

TESTS ON YAZOO VERY FINE SANDY LOAM, ALMA PLANTATION, LAKELAND (HARVESTED OCT. 30)

P. O. J. 36–M	19.05	15.85	12.68	80.00	173.8	3,311	11.51
P. O. J. 213	24.36	15.00	12.07	80.47	165.9	4,041	12.06
P. O. J. 234	17.94	16.85	14.13	83.86	198.7	3,565	10.07
Co. 281	21.81	15.95	12.83	80.44	176.4	3,847	11.34
Co. 290	44.34	15.33	12.01	78.34	172.4	7,644	11.60
C. P. 807	41.55	13.68	10.58	77.34	139.3	5,788	14.36

[1] For yield differences between varieties and their statistical significance see table 8.
[2] Tentative classification.

TABLE 8.—*Differences in average yields observed between sugarcane varieties in first-stubble tests on light soil at different localities in Louisiana (table 7)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Midway	Oaklawn	Albania	Erath	Alma	Average of 8 tests
Co. 290	P. O. J. 234	+16.47	+18.52	+16.69	+12.30	+15.30	+14.88	+14.25	+26.40	+16.85
	P. O. J. 213	+15.15	+12.65	+15.30	+9.90	+15.00	+13.20	+10.75	+19.98	+13.99
	P. O. J. 36–M	+14.82	+18.76	+12.62	+10.50	+14.70	+13.08	+13.55	+25.29	+15.41
	Co. 281	+12.84	+13.20	+12.94	+8.10	+5.70	+9.18	+12.50	+22.53	+12.12
	C. P. 807	+4.66	+6.49	+3.43	−1.80	−4.20	+.93	−.35	+2.79	+1.49
C. P. 807	P. O. J. 234	+11.81	+12.03	+13.26	+14.10	+19.50	+13.95	+14.60	+23.61	+15.36
	P. O. J. 213	+10.49	+6.16	+11.87	+11.70	+19.20	+12.27	+11.10	+17.19	+12.50
	P. O. J. 36–M	+10.16	+12.27	+9.19	+12.30	+18.90	+12.15	+13.90	+22.50	+13.92
	Co. 281	+8.18	+6.71	+9.51	+9.90	+9.90	+8.25	+12.85	+19.74	+10.63
Co. 281	P. O. J. 234	+3.63	+5.32	+3.75	+4.20	+9.60	+5.70	+1.75	+3.87	+4.73
	P. O. J. 213	+2.31	−.55	+2.36	+1.80	+9.30	+4.02	−1.75	−2.55	+1.87
	P. O. J. 36–M	+1.98	+5.56	−.32	+2.40	+9.00	+3.90	+1.05	+2.76	+3.29
P. O. J. 36–M	P. O. J. 234	+1.63	−.24	+4.07	+1.80	+.60	+1.80	+.70	+1.11	+1.44
P. O. J. 213	P. O. J. 36–M	−.33	+6.11	−2.68	+.60	−.30	−.12	+2.80	+5.31	+1.42
	P. O. J. 234	+1.32	+5.67	+1.39	+2.40	+.30	+1.68	+3.50	+6.42	+2.86
Difference for P=0.05		±2.25	±2.07	±2.52	±1.93	±3.32	±3.26	±2.57	±5.13	±2.64
Difference for P=0.01		±3.01	±2.77	±3.37	±2.58	±4.42	±4.43	±3.49	±6.86	±3.54

TABLE 8.—*Differences in average yields observed between sugarcane varieties in first-stubble tests on light soil at different localities in Louisiana (table 7)*—Continued

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS)[1]

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Midway	Oaklawn	Albania	Erath	Alma	Average of 8 tests
P. O. J. 234	C. P. 807	+35.0	+34.9	+26.2	+42.0	+24.0	+22.8	+55.5	+59.4	+39.2
	P. O. J. 36–M	+32.8	+31.9	+37.1	+35.3	+22.4	+32.7	+33.6	+24.9	+32.0
	P. O. J. 213	+23.7	+23.7	+18.3	+24.7	+33.1	+21.8	+23.9	+32.8	+25.4
	Co. 290	+11.6	+24.1	+10.6	+10.0	−7.4	−6.9	+9.8	+26.3	+12.2
	Co. 281	+8.3	+8.5	+6.4	+16.0	−6.3	−9.3	+1.1	+22.3	+6.7
Co. 281	C. P. 807	+26.7	+26.4	+19.8	+26.0	+30.3	+32.1	+54.4	+37.1	+32.5
	P. O. J. 36–M	+24.5	+23.4	+30.7	+19.3	+28.7	+42.0	+32.5	+2.6	+25.3
	P. O. J. 213	+15.4	+15.2	+11.9	+8.7	+39.4	+31.1	+22.8	+10.5	+18.7
	Co. 290	+3.3	+15.6	+4.2	−6.0	−1.1	+2.4	+8.7	+4.0	+5.5
Co. 290	C. P. 807	+23.4	+10.8	+15.6	+32.0	+31.4	+29.7	+45.7	+33.1	+27.0
	P. O. J. 36–M	+21.2	+7.8	+26.5	+25.3	+29.8	+39.6	+23.8	−1.4	+19.8
	P. O. J. 213	+12.1	−.4	+7.7	+14.7	+40.5	+28.7	+14.1	+6.5	+13.2
P. O. J. 213	C. P. 807	+11.3	+11.2	+7.9	+17.3	−9.1	+1.0	+31.6	+26.6	+13.8
	P. O. J. 36–M	+9.1	+8.2	+18.8	+10.6	−10.7	+10.9	+9.7	−7.9	+6.6
P. O. J. 36–M	C. P. 807	+2.2	+3.0	−10.9	+6.7	+1.6	−9.9	+21.9	+34.5	+7.2
Difference for P=0.05		±4.42	±5.48	±10.35	±5.97	±10.63	±12.00	±5.79	[2]	±8.12
Difference for P=0.01		±5.92	±7.32	±13.83	±7.99	±14.18	±16.30	±7.87	[2]	±10.88

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)

Co. 290	P. O. J. 36–M	+3,722	+3,835	+3,208	+2,002	+3,486	+3,503	+3,153	+4,333	+3,405
	P. O. J. 234	+3,544	+3,137	+3,086	+1,947	+3,340	+3,358	+3,009	+4,079	+3,187
	P. O. J. 213	+3,635	+2,469	+3,226	+1,800	+3,666	+3,350	+2,498	+3,603	+3,031
	Co. 281	+2,842	+2,185	+2,466	+1,417	+1,236	+1,963	+2,624	+3,797	+2,316
	C. P. 807	+1,699	+1,623	+1,236	+431	+77	+1,043	+971	+1,856	+1,117
C. P. 807	P. O. J. 36–M	+2,023	+2,212	+1,972	+1,571	+3,409	+2,460	+2,182	+2,477	+2,288
	P. O. J. 234	+1,845	+1,514	+1,850	+1,516	+3,263	+2,315	+2,038	+2,223	+2,070
	P. O. J. 213	+1,936	+846	+1,990	+1,369	+3,589	+2,307	+1,527	+1,747	+1,914
	Co. 281	+1,143	+562	+1,230	+986	+1,159	+920	+1,653	+1,941	+1,199
Co. 281	P. O. J. 36–M	+880	+1,650	+742	+585	+2,250	+1,540	+529	+536	+1,089
	P. O. J. 234	+702	+952	+620	+530	+2,104	+1,395	+385	+282	+871
	P. O. J. 213	+793	+284	+760	+383	+2,430	+1,387	−126	−194	+715
P. O. J. 213	P. O. J. 36–M	+87	+1,366	−18	+202	−180	+153	+655	+730	+374
	P. O. J. 234	−91	+668	−140	+147	−326	+8	+511	+476	+157
P. O. J. 234	P. O. J. 36–M	+178	+698	+122	+55	+146	+145	+144	+254	+218
Difference for P=0.05		±690	±448	±708	±294	±666	±993	±516	[2]	±445
Difference for P=0.01		±921	±599	±946	±394	±885	±1,353	±701	[2]	±596

[1] Averages of the 8 tests are weighted.

[2] Juice from individual samples composited for analysis and significance of observed varietal differences, therefore not measurable.

Indicated yields of sugar per ton of cane obtained from Co. 290 were on the whole lower than corresponding ones from P. O. J. 234 and Co. 281, but higher than those from either P. O. J. 213, P. O. J. 36–M, or C. P. 807. While the average difference in indicated yield of sugar per ton of cane of 12.2 pounds in favor of P. O. J. 234 is unquestionably significant, it is interesting to note that in two instances (Oaklawn and Albania) Co. 290 slightly surpassed P. O. J. 234 in indicated yield of sugar per ton of cane. This may be attributable to the fact that during the severe drought, which occurred in that section during the early summer, Co. 290 maintained much more satisfactory growth than did the P. O. J. varieties, an advantage which must have correspondingly affected its relative maturity at harvest. Co. 290 was significantly higher than Co. 281 in indicated yield of sugar per ton of cane at Midway, while significantly under Co. 281 at Greenwood and Erath. The average difference of 5.5 tons in favor of Co. 281 is not statistically significant, but it is definitely in line with previous

comparisons. The superiority of Co. 290 to P. O. J. 36–M, P. O. J. 213, and C. P. 807 in indicated yield of sugar per ton of cane was in most cases consistently and significantly maintained. The average differences of over 13 pounds as compared with P. O. J. 213, almost 20 pounds as compared with P. O. J. 36–M, and 27 pounds as compared with C. P. 807 are all statistically significant. Co. 290 gave indicated yields of sugar per acre greater than corresponding ones from C. P. 807 at all stations with an average difference in excess of 1,100 pounds. It outyielded Co. 281 by an average difference of over 2,300 pounds and the varieties P. O. J. 213, P. O. J. 36–M, and P. O. J. 234 by over 3,000 pounds in each case.

C. P. 807 maintained its usual lead over Co. 281, P. O. J. 234, P. O. J. 213, and P. O. J. 36–M in yield of cane per acre. The observed differences were definitely significant in all tests and averaged over 10½ tons per acre in comparison with Co. 281, 12½ tons in comparison with P. O. J. 213, nearly 14 tons in comparison with P. O. J. 36–M, and over 15 tons in comparison with P. O. J. 234. Its indicated yields of sugar per ton of cane were significantly lower than corresponding ones from P. O. J. 213 in 5 cases out of 8 comparisons involved and in the mean of all tests with an average difference of almost 14 pounds. It was significantly under P. O. J. 36–M in 3 tests, but in 2 tests, its indicated yields of sugar per ton of cane were approximately 10 pounds in excess of corresponding ones from P. O. J. 36–M. C. P. 807 afforded cane of lowest relative maturity in tests on Alma plantation, where its indicated yield of sugar per ton of cane was 34.5 pounds under that of P. O. J. 36–M and 26.6 pounds under that of P. O. J. 213. Indicated yields of sugar per acre obtained with C. P. 807 were in all cases significantly greater than corresponding ones from either Co. 281, P. O. J. 36–M, P. O. J. 213, or P. O. J. 234 with average differences ranging from approximately 1,200 pounds as compared with Co. 281 to nearly 2,300 pounds as compared with P. O. J. 36–M.

Yields of cane per acre obtained with Co. 281 were usually better than corresponding ones obtained with either of the P. O. J. varieties. The average differences of 4.73 tons, as compared with P. O. J. 234, and 3.29, as compared with P. O. J. 36–M, may both be regarded as significant. Its yield superiority to P. O. J. 234 was rather consistently maintained, but observed differences as compared with P. O. J. 36–M were significant at only 4 out of 8 test fields. In other cases, Co. 281 afforded yields approximately equal to or insignificantly greater than yields obtained with P. O. J. 36–M. In comparison with P. O. J. 213, as to yield of cane per acre, the advantage was significantly in favor of Co. 281 at Raceland, Oaklawn, and Albania, while the results at other test fields were variable. The difference of 1.87 tons per acre in favor of Co. 281 in the average of all tests is of questionable significance.

As previously indicated, P. O. J. 213, P. O. J. 234, and P. O. J. 36–M were unquestionably the three least desirable varieties of the group under prevailing conditions, being rather consistently the lowest three in yield of cane and sugar per acre. P. O. J. 213 and P. O. J. 36–M were in addition consistently among the lowest in indicated yield of sugar per ton of cane. P. O. J. 234 showed its usual advantage in indicated yield of sugar per ton of cane, but due to its characteristically low yields of cane, ranked fifth in the average of all

tests in indicated yield of sugar per acre with an average of only 50 percent of the corresponding yield obtained with Co. 290. The indicated yield of sugar per acre obtained with P. O. J. 36–M in the average of all tests approximated 47 percent and that obtained with P. O. J. 213 approximated 52 percent of the corresponding yield from Co. 290. Relative results obtained with P. O. J. 213 were highly variable, as indicated by its performance at Greenwood and at Oaklawn amounting in the latter case to but slightly over one-third of the corresponding yield from either C. P. 807 or Co. 290. While indicated yields of sugar per acre observed in tests at Midway, Oaklawn, and Erath were in the average of all varieties markedly lower than the corresponding yields in tests at the more eastern localities of Raceland, Greenwood, and Houma, the proportionately greater differences in yields in the case of the varieties P. O. J. 36–M and P. O. J. 234 indicate that these two varieties were more adversely affected by the unfavorable weather conditions prevailing at the western test fields than were the other varieties included in the tests.

The results obtained on Midway plantation are worthy of special mention in that very low yields of cane per acre and, in sharp contrast with results at other western stations, unusually low yields of sugar per ton of cane were obtained. The average indicated yield of sugar per ton of cane for all varieties was approximately 40 pounds less than observed on the average with the same varieties at Oaklawn, where variety plots were harvested on the previous day. The unsatisfactory results obtained were undoubtedly due to the fact that cultivation operations on Midway plantation were begun at the very late date of May 20, and the growth, as well as the maturity of the crop, was thereby unquestionably retarded.

FIRST-STUBBLE TESTS ON HEAVY SOIL

Results of first-stubble variety tests on heavy soil with Co. 290, C. P. 807, Co. 281, and P. O. J. 234 at several representative localities are given in tables 9 and 10. Comparisons of C. P. 807 and Co. 290 are available from four localities—namely, Raceland, Greenwood, Houma, and Alma—where trends more or less similar to ones observed in first-stubble tests on light soil were apparent; i. e., no great average difference in yield of cane per acre and a definite advantage in favor of Co. 290 in indicated yield of sugar per ton of cane. In the average of these four tests, Co. 290 outyielded C. P. 807 by an indicated yield of over 22 pounds of sugar per ton of cane and over 700 pounds of sugar per acre. The significant cane yield difference in favor of Co. 290 observed at Raceland, where apparently favorable growth conditions prevailed, and the difference in the opposite direction at Greenwood, where apparently less satisfactory growth conditions existed, may be an indication of a lesser capacity in Co. 290 to tolerate extremely adverse growth conditions. Average yields of cane and indicated yields of sugar per acre obtained from Co. 290 were more than double those from P. O. J. 234 and exceeded corresponding ones from Co. 281 by 10½ tons of cane and slightly more than 2,000 pounds of sugar per acre, with average indicated yields of sugar per ton of cane but 5.6 pounds below corresponding yields of P. O. J. 234 and 5.2 pounds in excess of corresponding yields from Co. 281.

TABLE 9.—*Results of first-stubble variety tests on heavy soil in Louisiana during 1933*

TESTS ON SHARKEY CLAY, GODCHAUX PLANTATION, RACELAND (HARVESTED NOV. 22)

Variety	Average acre yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 234	16.77	16.79	14.37	85.59	204.2	3,424	9.79
Co. 281	22.23	16.57	13.76	83.04	192.5	4,279	10.39
Co. 290	33.57	16.53	13.47	81.49	197.7	6,637	10.12
C. P. 807	29.70	15.79	13.09	82.90	179.3	5,325	11.15

TESTS ON SHARKEY CLAY, GREENWOOD PLANTATION, THIBODAUX (HARVESTED NOV. 24)

P. O. J. 234	9.36	17.24	14.87	86.25	212.2	1,986	9.43
Co. 281	11.16	16.92	14.18	83.81	199.3	2,224	10.04
Co. 290	19.22	16.66	13.70	82.23	202.1	3,884	9.90
C. P. 807	21.64	15.61	13.00	83.28	178.5	3,863	11.20

TESTS ON SHARKEY CLAY, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED NOV. 17)

P. O. J. 36-M	22.30	15.00	11.67	77.80	157.3	3,508	12.71
P. O. J. 213	19.31	15.33	12.51	81.60	173.4	3,348	11.53
P. O. J. 234	12.24	16.17	13.32	82.37	185.5	2,271	10.78
Co. 281	25.20	16.03	13.03	81.28	180.2	4,541	11.10
Co. 290	37.15	16.41	13.13	80.01	190.7	7,084	10.49
C. P. 807	36.66	15.21	12.38	81.39	167.9	6,155	11.91

TESTS ON BERWICK CLAY,[2] OAKLAWN PLANTATION, FRANKLIN (HARVESTED NOV. 9)

P. O. J. 234	4.41	16.81	14.09	83.82	198.1	874	10.10
Co. 281	11.58	16.90	14.11	83.49	198.0	2,293	10.10
C. P. 807	19.32	15.70	13.07	83.25	179.4	3,466	11.15

TESTS ON SHARKEY HEAVY SILT LOAM, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED NOV. 9)

P. O. J. 36-M	29.94	14.96	11.66	77.94	157.4	4,713	12.71
C. P. 27/153	33.32	16.23	12.00	73.94	156.8	5,225	12.76
C. P. 28/11	34.00	17.92	14.53	81.08	196.6	6,684	10.17
C. P. 28/19	34.12	17.84	14.96	83.86	206.2	7,036	9.70

TESTS ON IBERIA SILTY CLAY LOAM, ALBANIA PLANTATION, JEANERETTE (HARVESTED NOV. 15)

P. O. J. 234	8.31	17.87	15.58	87.19	223.5	1,857	8.95
Co. 281	14.46	17.59	15.03	85.45	213.4	3,086	9.37
C. P. 807	19.65	16.37	13.84	84.54	191.6	3,765	10.44

TESTS ON SHARKEY CLAY, ALMA PLANTATION, LAKELAND (HARVESTED OCT. 31)

P. O. J. 234	14.47	16.01	13.09	81.76	181.6	2,628	11.01
Co. 281	17.32	15.44	12.39	80.25	170.1	2,946	11.76
Co. 290	28.04	15.24	11.85	77.76	169.3	4,747	11.81
C. P. 807	28.04	13.97	10.93	78.24	144.9	4,063	13.80

[1] For yield differences between varieties and their statistical significance see table 10.
[2] Tentative classification.

TABLE 10.—*Differences in average yields observed between sugarcane varieties in first-stubble tests on heavy soil at different localities in Louisiana (table 9)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Race-land	Green-wood	Houma	Oak-lawn	Albania	Alma	Average of 6 tests [1]
Co. 290	P. O. J. 234	+16.80	+9.86	+24.91			+13.57	+16.28
	Co. 281	+11.34	+8.06	+11.95			+10.72	+10.52
	C. P. 807	+3.87	−2.42	+.49			0	+.48
C. P. 807	P. O. J. 234	+12.93	+12.28	+24.42	+14.91	+11.34	+13.57	+14.91
	Co. 281	+7.47	+10.48	+11.46	+7.74	+5.19	+10.72	+8.84
Co. 281	P. O. J. 234	+5.46	+1.80	+12.96	+7.17	+6.15	+2.85	+6.06
Difference for P=0.05		±3.07	±3.30	±2.14	±1.80	±3.16	±4.28	±3.51
Difference for P=0.01		±4.25	±4.57	±2.89	±2.50	±4.79	±5.90	±4.87

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS) [2]

P. O. J. 234	C. P. 807	+24.9	+33.7	+17.6	+18.7	+31.9	+36.7	+27.1
	Co. 281	+11.7	+12.9	+5.3	+.1	+10.1	+11.5	+8.9
	Co. 290	+6.5	+10.1	−5.2			+12.3	+5.6
Co. 290	C. P. 807	+18.4	+23.6	+22.8			+24.4	+22.3
	Co. 281	+5.2	+2.8	+10.5			−.8	+5.2
Co. 281	C. P. 807	+13.2	+20.8	+12.3	+18.6	+21.8	+25.2	+18.2
Difference for P=0.05		±5.43	±4.86	[3]	±12.97	±8.48	[3]	±8.31
Difference for P=0.01		±7.52	±6.73		±18.06	±12.84		±11.50

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)

Co. 290	P. O. J. 234	+3,213	+1,898	+4,813			+2,119	+3,011
	Co. 281	+2,358	+1,660	+2,543			+1,801	+2,090
	C. P. 807	+1,312	+21	+929			+684	+736
C. P. 807	P. O. J. 234	+1,901	+1,877	+3,884	+2,592	+1,908	+1,435	+2,266
	Co. 281	+1,046	+1,639	+1,614	+1,173	+679	+1,117	+1,211
Co. 281	P. O. J. 234	+855	+238	+2,270	+1,419	+1,229	+318	+1,055
Difference for P=0.05		±595	±651	[3]	±369	±579	[3]	±703
Difference for P=0.01		±824	±898		±513	±876		±973

[1] Excluding Co. 290, which was included in 4 tests only.
[2] Averages of the 6 tests are weighted.
[3] Juice from individual samples composited for analysis and significance of observed varietal differences, therefore not measurable.

C. P. 807 showed its usual vigor with average yields of cane per acre ranging from 19 to more than 36 tons, which were in all instances significantly greater than corresponding ones from either Co. 281 or P. O. J. 234. Its average indicated yield of 171.8 pounds of sugar per ton of cane was over 27 pounds less than the average indicated yield from P. O. J. 234 and over 18 pounds less than that from Co. 281. Its average indicated yield of sugar per acre was more than twice as great as the corresponding yield from P. O. J. 234 and over 1,200 pounds in excess of average indicated yields obtained with Co. 281.

Yields of cane and sugar per acre obtained with P. O. J. 234 were definitely unsatisfactory and in most cases positively uneconomical. This was particularly true at Oaklawn plantation, where it yielded at the rate of less than 4½ tons of cane and less than 900 pounds of sugar per acre. Co. 281 proved more desirable than P. O. J. 234 under conditions of the tests and, in certain instances, notably at Houma and Raceland, where growth conditions were apparently favorable, gave comparatively satisfactory results. At Greenwood and Oaklawn, this variety gave very unsatisfactory results, thus confirming previous conclusions that Co. 281 cannot be universally recommended for Sharkey clay and other poorly drained soils of similar physical properties. At Houma, P. O. J. 36–M and P. O. J. 213 proved more desirable than P. O. J. 234, but definitely inferior to either Co. 281,

C. P. 807, or Co. 290. The two varieties were not included in the other tests.

In one test at Houma (table 9), C. P. 28/11 appeared in comparison with C. P. 28/19. While observed yield differences are insignificant, the results confirm previous observations by showing C. P. 28/19 to slightly better advantage. C. P. 28/11 has demonstrated in limited tests a susceptibility to wind damage which may prove an extremely undesirable characteristic under Louisiana conditions. In tests in Louisiana and at Cairo, Ga.,[6] under wind velocities not altogether unusual (estimated between 30 and 35 miles per hour), tops of this variety were bent with a resulting serious growth deformity which would have greatly interfered with satisfactory stripping.

SECOND-STUBBLE TESTS ON LIGHT SOIL

The results of second-stubble variety tests on light soil, given in tables 11 and 12, afford additional evidence of the superior stubbling qualities of Co. 290 and C. P. 807. The heavy average yield for all tests of over 33 tons of cane per acre obtained with each, which was more than double the average yield obtained with Co. 281 and almost three times that obtained with P. O. J. 213, is more or less in accord with previous records and indicates rather definitely that these two vigorous varieties will produce at least two profitable stubble crops. Co. 290 gave yields of cane per acre significantly higher than those of C. P. 807 at Greenwood, but practically equal to those of C. P. 807 at Alma and Raceland, with an average insignificant difference of less than 1 ton in favor of Co. 290. Co. 290 was higher than C. P. 807 in indicated yield of sugar per ton of cane by a wide margin of 30 pounds per ton of cane on the average, the approximate of which was consistently maintained in the three tests. Indicated yields of sugar per acre observed with Co. 290 ranged between 5,617 and 5,937 pounds and exceeded corresponding yields obtained with C. P. 807 by over 1,000 pounds in each case and by an average difference of over 1,100 pounds. Considering the period over which the tests were harvested (Oct. 26 to 30) indicated yields of sugar per ton of cane obtained with Co. 290, ranging from 161.0 to 184.2 pounds, are considered exceedingly satisfactory.

TABLE 11.—*Results of second-stubble variety tests on light soil in Louisiana during 1933*

ON YAZOO VERY FINE SANDY LOAM, GODCHAUX PLANTATION, RACELAND (HARVESTED OCT. 26)

Variety	Average acre yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	16.71	13.75	10.07	73.24	130.7	2,184	15.30
P. O. J. 213	12.58	13.26	9.71	73.23	126.1	1,586	15.86
P. O. J. 234	7.60	14.74	11.43	77.54	153.8	1,169	13.00
Co. 281	23.20	14.73	11.48	77.94	154.9	3,594	12.91
Co. 290	36.85	15.12	11.45	75.73	161.0	5,933	12.42
C. P. 807	36.56	13.61	10.28	75.53	133.4	4,877	14.99

[1] For yield differences between varieties and their statistical significance see table 12.

[6] Reported by B. A. Belcher in correspondence.

TABLE 11.—*Results of second-stubble variety tests on light soil in Louisiana during 1933*—Continued

ON YAZOO VERY FINE SANDY LOAM, GREENWOOD PLANTATION, THIBODAUX (HARVESTED OCT. 23)

Variety	Average acre yield of cane	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 36–M	12.70	16.09	12.78	79.43	174.4	2,215	11.47
P. O. J. 213	17.02	15.15	12.01	79.27	163.7	2,786	12.22
P. O. J. 234	12.20	16.86	13.91	82.50	193.9	2,366	10.31
Co. 281	15.22	16.45	13.52	82.19	188.1	2,863	10.63
Co. 290	32.23	15.91	12.70	79.82	184.2	5,937	10.86
C. P. 807	29.68	14.53	11.62	79.97	156.0	4,630	12.82
ON YAZOO VERY FINE SANDY LOAM, ALMA PLANTATION, LAKELAND (HARVESTED OCT. 30)							
P. O. J. 36–M	7.00	16.07	12.86	80.02	176.3	1,234	11.34
P. O. J. 213	5.60	15.62	12.47	79.83	170.7	956	11.72
P. O. J. 234	4.20	16.66	13.57	81.45	187.8	789	10.65
Co. 281	11.20	16.12	12.89	79.96	176.6	1,978	11.32
Co. 290	32.60	15.78	12.14	76.93	172.3	5,617	11.61
C. P. 807	32.80	13.91	10.63	76.42	139.0	4,559	14.39
ON CREVASSE SILTY CLAY LOAM, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED NOV. 6)							
P. O. J. 36	18.13	14.96	11.88	79.41	162.1	2,939	12.34
P. O. J. 36–M	21.44	15.26	12.22	80.08	167.6	3,593	11.93
P. O. J. 213	12.75	14.94	12.27	82.13	170.6	2,175	11.72
P. O. J. 234	4.63	16.35	13.84	84.65	195.6	906	10.22
Co. 281	16.29	15.91	13.12	82.46	182.8	2,978	10.94
C. P. 807	33.56	14.72	11.92	80.98	161.1	5,407	12.41

TABLE 12.—*Differences in average yields observed between sugarcane varieties in second-stubble tests on light soil at different localities in Louisiana (table 11)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Alma	Average of 4 tests[1]
Co. 290	P. O. J. 234	+29.25	+20.03	----------	+28.40	+25.89
	P. O. J. 213	+24.27	+15.21	----------	+27.00	+22.16
	P. O. J. 36–M	+20.14	+19.53	----------	+25.60	+21.76
	Co. 281	+13.65	+17.01	----------	+21.40	+17.35
	C. P. 807	+.29	+2.55	----------	−.20	+.88
C. P. 807	P. O. J. 234	+28.96	+17.48	+28.93	+28.60	+25.99
	P. O. J. 213	+23.98	+12.66	+20.81	+27.20	+21.16
	P. O. J. 36–M	+19.85	+16.98	+12.12	+25.80	+18.69
	Co. 281	+13.36	+14.46	+17.27	+21.60	+16.67
Co. 281	P. O. J. 234	+15.60	+3.02	+11.66	+7.00	+9.32
	P. O. J. 213	+10.62	−1.80	+3.54	+5.60	+4.49
	P. O. J. 36–M	+6.49	+2.52	−5.15	+4.20	+2.01
P. O. J. 36–M	P. O. J. 234	+9.11	+.50	+16.81	+2.80	+7.30
	P. O. J. 213	+4.13	−4.32	+8.69	+1.40	+2.47
P. O. J. 213	P. O. J. 234	+4.98	+4.82	+8.12	+1.40	+4.83
Difference for P=0.05	----------	±3.63	±2.30	±4.52	±4.00	±5.86
Difference for P=0.01	----------	±4.87	±3.08	±6.05	±5.35	±8.20

[1] Excluding Co. 290 which was included in 3 tests only.

TABLE 12.—*Differences in average yields observed between sugarcane varieties in second-stubble tests on light soil at different localities in Louisiana (table 11)*—Continued

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS)[2]

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Alma	Average of 4 tests
P. O. J. 234	P. O. J. 213	+27.7	+30.2	+25.0	+17.1	+25.0
	P. O. J. 36–M	+23.1	+19.5	+28.0	+11.5	+20.6
	C. P. 807	+20.4	+37.9	+34.5	+48.8	+35.4
	Co. 290	−7.2	+9.7		+15.5	+8.1
	Co. 281	−1.1	+5.8	+12.8	+11.2	+7.2
Co. 281	P. O. J. 213	+28.8	+24.4	+12.2	+5.9	+17.8
	P. O. J. 36–M	+24.2	+13.7	+15.2	+.3	+13.4
	C. P. 807	+21.5	+32.1	+21.7	+37.6	+28.2
	Co. 281	+6.1	−3.9		−4.3	+2.0
Co. 290	P. O. J. 213	+34.9	+20.5		+1.6	+20.6
	P. O. J. 36–M	+30.3	+9.8		+4.0	+17.3
	C. P. 807	+27.6	+28.2		+33.3	+30.0
P. O. J. 213	do	−7.3	+7.7	+9.5	+31.7	+10.4
P. O. J. 36–M	do	−2.7	+18.4	+6.5	+37.3	+14.8
Do	P. O. J. 213	+4.6	+10.7	−3.0	+5.6	+4.4
Difference for P=0.05			[3]	[3]	[3]	±11.3
Difference for P=0.01						±15.9

DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)

Co. 290	P. O. J. 234	+4,764	+3,571		+4,828	+4,388
	P. O. J. 213	+4,347	+3,151		+4,661	+4,053
	P. O. J. 36–M	+3,749	+3,722		+4,383	+3,951
	Co. 281	+2,339	+3,074		+3,639	+3,017
	C. P. 807	+1,056	+1,307		+1,058	+1,140
C. P. 807	P. O. J. 234	+3,708	+2,264	+4,501	+3,770	+3,561
	P. O. J. 213	+3,291	+1,844	+3,232	+3,603	+2,992
	P. O. J. 36–M	+2,693	+2,415	+1,814	+3,325	+2,562
	Co. 281	+1,283	+1,767	+2,429	+2,581	+2,015
Co. 281	P. O. J. 234	+2,425	+497	+2,072	+1,189	+1,546
	P. O. J. 213	+2,008	+77	+803	+1,022	+977
	P. O. J. 36–M	+1,410	+648	−615	+744	+547
P. O. J. 36–M	P. O. J. 234	+1,015	−151	+2,687	+445	+999
	P. O. J. 213	+598	−571	+1,418	+278	+431
P. O. J. 213	P. O. J. 234	+417	+420	+1,269	+167	+568
Difference for P=0.05			[3]	[3]	[3]	±896
Difference for P=0.01						±1,254

[2] Averages of the 4 tests are weighted.

[3] Juice from individual samples composited for analysis and significance of observed varietal differences, therefore not measurable.

The average indicated yield of sugar per ton of cane, 147.4, obtained with C. P. 807 was approximately 10 pounds under the corresponding yield from P. O. J. 213 and nearly 15 pounds under that from P. O. J. 36–M. The very unsatisfactory indicated yields of 133.4 and 139.0 pounds of sugar per ton of cane obtained from C. P. 807 at Raceland and Alma, respectively, were among the lowest from commercial varieties in the comparative tests, although at Raceland comparable yields from P. O. J. 36–M and P. O. J. 213 were still lower. Indicated yields of sugar per acre from C. P. 807 averaged slightly more than 2,000 pounds in excess of corresponding yields from Co. 281, over 2,500 pounds in excess of corresponding yields from P. O. J. 36–M, and nearly 3,000 pounds in excess of those from P. O. J. 213.

Co. 281 gave generally higher yields of cane per acre than either P. C. J. 36–M, P. O. J. 213, or P. O. J. 234. This trend was consistently maintained except at Houma, where the yield from Co. 281 fell significantly below that of P. O. J. 36–M and at Greenwood, where it was slightly under that of P. O. J. 213. The indicated yield of

154.9 pounds of sugar per ton of cane from Co. 281 at Raceland was considerably under the yields elsewhere, but the average of 175.6 pounds for all tests is considered very satisfactory in view of the period over which the tests were harvested. In the average of all tests it yielded nearly 18 pounds more sugar per ton of cane than P. O. J. 213, over 13 pounds more than P. O. J. 36–M, over 28 pounds more than C. P. 807, and approximately 7 pounds less than P. O. J. 234. Observed yields of cane per acre obtained with Co. 281, with the exception of the low yield of 11.2 tons obtained on Alma plantation, were probably all economical ones. The indicated yields of sugar per acre at Raceland, Houma, and Greenwood, ranging from 2,863 to 3,594, are considered satisfactory.

The results obtained with P. O. J. 213 and P. O. J 36–M confirm more or less general views as to the questionable value of these two varieties for second stubble. The disastrously low cane yields of 5.6 and 7.0 tons per acre, respectively, obtained with these varieties on Alma plantation, where both C. P. 807 and Co. 290 yielded at the rate of nearly 33 tons per acre, emphasize the little dependence which may be placed in their stubbling qualities. The results obtained with P. O. J. 36–M at Houma and Raceland and those obtained with P. O. J. 213 at Greenwood are the only ones with these varieties which may be regarded as moderately satisfactory. Results obtained with P. O. J. 234 ranged from highly unsatisfactory to practically complete failure, as indicated by its average yields of only slightly over 7 tons of cane and approximately 1,300 pounds of sugar per acre.

SECOND-STUBBLE TESTS ON HEAVY SOIL

The factors involved in stubble deterioration under Louisiana conditions usually manifest themselves most conspicuously in soils of the Sharkey clay and related groups. Therefore, especially in view of the unfavorable climatic conditions under which the cane grew (p. 4), the results reported in tables 13 and 14 are extremely interesting from a standpoint of varietal differences in stubbling capacity. Under these severe conditions, C. P. 807 yielded at the average rate of 28.79 tons of cane per acre and at the indicated rate of over 4 500 pounds of sugar per acre and afforded very satisfactory results in all cases. Its average indicated yield of over 156 pounds of sugar per ton of cane exceeded the average obtained from P. O. J. 213 by over 15 pounds and was slightly in excess of the average yield from Co. 281. This somewhat unusual advantage demonstrated by C. P. 807 under existing conditions is probably due to the comparatively inferior early stands obtained with Co. 281 and P. O. J. 213 and the resulting late suckering by the latter varieties. Yields of cane and indicated yields of sugar per acre obtained with Co. 281 were on the whole comparatively satisfactory but, in all cases, significantly under corresponding ones from C. P. 807 with an average difference of 11 tons of cane and nearly 1,800 pounds of sugar per acre. Results obtained with P. O. J. 213 were distinctly less satisfactory than those obtained with Co. 281 in each test, it having yielded an average of 5 tons less cane and nearly 975 pounds less sugar per acre. Co. 290, in the single test in which it was included, gave a high yield of 31.66 tons of cane and an indicated yield of 5,430 pounds of sugar per acre.

TABLE 13.—*Results of second-stubble variety tests on Sharkey clay in Louisiana during 1933*

ON GODCHAUX PLANTATION, RACELAND (HARVESTED OCT. 27)

Variety	Average acre yield of cane [1]	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 213	10.20	13.99	10.78	77.05	144.5	1,474	13.84
Co. 281	18.45	14.91	11.65	78.14	157.5	2,906	12.70
C. P. 807	36.40	15.21	12.41	81.59	168.5	6,133	11.87
ON GREENWOOD PLANTATION, THIBODAUX (HARVESTED OCT. 23)							
P. O. J. 213	15.14	14.29	10.87	76.07	144.6	2,189	13.83
Co. 281	16.83	14.86	11.51	77.46	154.8	2,605	12.92
C. P. 807	23.14	14.39	11.41	79.29	152.5	3,529	13.11
ON UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED OCT. 25)							
P. O. J. 36	16.32	13.98	10.50	75.11	138.6	2,262	14.43
P. O. J. 36–M	13.27	13.90	10.30	74.10	134.8	1,789	14.84
P. O. J. 213	12.58	13.47	10.15	75.35	134.2	1,688	14.90
Co. 281	18.10	14.65	11.34	77.41	152.4	2,758	13.12
C. P. 807	26.83	14.31	11.19	78.20	148.3	3,979	13.49
Co. 290	31.66	15.53	12.03	77.46	171.5	5,430	11.66

[1] For yield differences between varieties and their statistical significance see table 14.

TABLE 14.—*Differences in average yields observed between sugarcane varieties in second-stubble tests on heavy soil at different localities in Louisiana (table 13)*

DIFFERENCES IN YIELDS OF CANE PER ACRE (TONS)

Average yield obtained with—	Minus average yield obtained with—	Raceland	Greenwood	Houma	Average of 3 tests
C. P. 807	P. O. J. 213	+26.20	+8.00	+14.25	+16.15
	Co. 281	+17.95	+6.31	+8.73	+11.00
Co. 281	P. O. J. 213	+8.25	+1.69	+5.52	+5.15
Difference for P=0.05		±4.01	±2.61	±4.30	±10.76
Difference for P=0.01		±5.71	±3.71	±5.75	±17.80
DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER TON OF CANE (POUNDS) [1]					
Co. 281	P. O. J. 213	+13.0	+10.0	+18.2	+13.8
C. P. 807	Co. 281	+11.0	−2.3	−4.1	+3.0
	P. O. J. 213	+24.0	+7.9	+14.1	+16.8
Difference for P=0.05		[2]	[2]	[2]	±11.79
Difference for P=0.01		[2]	[2]	[2]	±19.50
DIFFERENCES IN INDICATED YIELDS OF 96° SUGAR PER ACRE (POUNDS)					
C. P. 807	P. O. J. 213	+4,659	+1,340	+2,291	+2,763
	Co. 281	+3,227	+924	+1,221	+1,791
Co. 281	P. O. J. 213	+1,432	+416	+1,070	+973
Difference for P=0.05		[2]	[2]	[2]	±2,020
Difference for P=0.01		[2]	[2]	[2]	±3,342

[1] Averages of the 3 tests are weighted.
[2] Juice from individual samples composited for analysis and significance of observed varietal differences, therefore not measurable.

THIRD-STUBBLE VARIETY TESTS

The cultivation of third stubble is not commonly practiced in Louisiana due to poor stands usually obtained with varieties now in general cultivation. In order to obtain information as to the relative capacities of the more recently introduced varieties, C. P. 807 and Co. 281, for prolonged stubbling, observations were conducted on third stubble in three tests during 1933, the results of which are given in table 15. It is interesting to note that in this extreme test of varietal vigor and general stubbling capacity, C. P. 807 consistently afforded yields of cane per acre which may be regarded as commercially profitable, with an average of over 22 tons per acre. Yields of cane per acre, ranging from 9½ to approximately 15½ tons and averaging less than 12½ tons obtained from Co. 281 do not recommend this variety very highly for a third stubble crop, in spite of its comparatively satisfactory indicated yield of sugar per ton of cane ranging from 130.7 to 152.9 pounds and averaging approximately 142 pounds. Almost complete stand failures were obtained with P. O. J. 213 in each instance, as indicated by its average yield of cane per acre below 3 tons. This is definitely in line with appraisals of this variety based on plantation results. It is generally out of the question to attempt to carry P. O. J. 213 through third stubble on a plantation scale. The consistently unsatisfactory indicated yield of sugar per ton of cane obtained with C. P. 807 and P. O. J. 213, averaging in each case below 125 pounds, while undoubtedly due in part to the early dates of harvest (Oct. 23 and 24), probably reflect the effect of extensive late suckering resulting from inadequate early stands.

TABLE 15.—*Results of third-stubble variety tests in Louisiana during 1933*

Variety	Average acre yield of cane	Laboratory-mill juice analyses at harvest			Indicated available 96° sugar at harvest		Cane for 1 ton of sugar
		Brix	Sucrose	Purity	Per ton of cane	Per acre	
ON YAZOO VERY FINE SANDY LOAM, GREENWOOD PLANTATION, THIBODAUX (HARVESTED OCT. 23)[1]							
	Tons		*Percent*		*Pounds*	*Pounds*	*Tons*
P. O. J. 213	3.30	13.27	9.56	72.04	122.8	405	16.29
Co. 281	9.50	14.99	11.46	76.45	152.9	1,453	13.08
C. P. 807	18.20	13.19	9.63	73.01	122.3	2,226	16.35
ON LIGHT SOIL, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED OCT. 24)[2]							
P. O. J. 213	2.11	12.70	9.36	73.70	122.0	257	16.39
Co. 281	15.47	14.13	10.73	75.94	142.6	2,206	14.03
C. P. 807	25.20	13.41	10.04	74.87	129.6	3,266	15.43
ON SHARKEY CLAY, UNITED STATES SUGAR PLANT FIELD STATION, HOUMA (HARVESTED OCT. 23)[3]							
P. O. J 213	2.42	13.13	9.64	73.42	125.4	303	15.95
Co. 281	12.24	14.03	10.15	72.34	130.7	1,600	15.30
C. P. 807	24.55	13.32	9.63	72.30	121.5	2,983	16.46

[1] For P=0.05 difference in yield of cane per acre=5.67 tons.
[2] For P=0.05 difference in yield of cane per acre=4.70 tons.
[3] For P=0.05 difference in yield of cane per acre=9.10 tons.

FIBER STUDIES

It is realized that while capacities of varieties as to indicated yield of sugar per ton of cane and per acre should form the primary basis of comparison in tests as to economic value, other important qualities while secondary in nature should not be overlooked in a careful comparative evaluation. Probably second only to sugar productiveness is the percentage of fiber in the cane. A consideration of the latter is of considerable importance in Louisiana on account of its effect on daily mill capacities. The Louisiana sugarcane crop must be handled in a comparatively short period which is definitely limited by the immaturity of cane on one hand and the danger of frost injury on the other. The results of fiber determinations on several important varieties of cane, made in connection with milling tests carried on in 1933, are given in table 16. In each case duplicate samples of 80 pounds of sugarcane were milled in accordance with the procedure described in a previous publication (*2*). The bagasse was weighed, and the percentage of fiber in it was determined and calculated to percentage in the cane. By this procedure accurate fiber determinations on the basis of comparatively large samples of cane were rendered possible, thus avoiding sampling errors incidental to the small samples necessarily used in connection with direct determinations from shredded cane and those usually encountered in connection with determinations from factory data, where percentage of fiber in cane must usually be arrived at by difference instead of by actual weight.

TABLE 16.—*Percentage of fiber in sugarcane of several varieties grown on light soi near Houma as computed from analyses of bagasse obtained in connection with experimental milling tests at the United States Sugar Plant Field Station, Houma, La., during 1933*

Variety	Percentage of fiber in cane							
	First-stubble harvested and milled Oct. 18		Plant cane harvested and milled Nov. 20		Plant cane harvested and milled Dec. 21		Average of 3 tests	
	Method 1[1]	Method 2[2]	Method 1[1]	Method 2[2]	Method 1[1]	Method 2[2]	Method 1[1]	Method 2[2]
P. O. J. 36–M					12. 54	12. 11		
P. O. J. 234					12. 64	12. 43		
P. O. J. 213	11. 61	10. 98	12. 46	11. 46	12. 63	12. 46	12. 23	11. 63
Co. 281			11. 77	11. 70	11. 87	11. 58		
Co. 290	10. 07	9. 16	10. 83	10. 46	10. 44	10. 25	10. 45	9. 96
C. P. 807	13. 68	12. 61	14. 41	14. 43	14. 60	14. 67	14. 23	13. 90
C. P. 28/11	13. 84	12. 62	13. 60	13. 49				
C. P. 28/19	14. 26	13. 08	14. 07	14. 30	15. 25	14. 90	14. 53	14. 09

[1] As per Spencer (*10, pp. 341–349*).
[2] By subjecting bagasse to diffusion in bath of running cold water for 10 days and drying to constant weight in oven at 100° C.

As explained in table 16, percentage of fiber in bagasse was determined according to the usual factory procedure (method no. 1) and also by subjecting a comparable sample to diffusion in cold water over a period of 10 days (method no. 2). The percentage of fiber determined according to the cold-water diffusion method was appreciably lower than corresponding values based on the usual factory method. Since values according to method no. 1 must necessarily be based on

certain arbitrary assumptions, such as, for instance, purity of sugar solution in bagasse equals purity of last mill juice, it would seem that fiber values obtained according to method no. 2 should prove the more dependable.

The varieties studied fell into three groups, according to percentage of fiber in case, as follows: (1) C. P. 807, C. P. 28/11, and C. P. 28/19, from approximately 12½ to approximately 14½ percent; (2) P. O. J. 36–M, P. O. J. 213, P. O. J. 234, and Co. 281, from approximately 11 to approximately 12½ percent; (3) Co. 290, from approximately 10 to slightly under 11 percent.

DISCUSSION AND CONCLUSIONS (1932–33 RESULTS)

The accurate appraisal of the relative merits of different varieties of sugarcane presents an extremely complicated problem. Its solution must be based on many considerations, some of which may not be adequately manifested in comparative yield trials. It is seldom, if ever, possible to obtain during a single year, or even over a period of several years, results that are thoroughly representative of each variety involved. It is manifestly true that the longer a variety has been under observation, the greater has been the opportunity for inherent pathological and other weaknesses to appear and, therefore, the more accurate estimates of its adaptability are likely to be. But, even with varieties under observation for a comparatively long period, occasionally, either through a combination of weather conditions or other causes, latent weaknesses will quite suddenly manifest themselves and completely upset previous estimates of relative adaptability. The widespread stand failures with P. O. J. 213 under conditions conducive to the development of red rot during 1930 illustrates this point.

Fortunately, through the use of laboratory and field methods developed or improved by pathologists of the Division of Sugar Plant Investigations, it is possible accurately to determine many of the inherent pathological weaknesses of sugarcane varieties under controlled experimental conditions. But all possible sources of trouble cannot be explored and, therefore, newly introduced varieties, however promising, should be regarded with a certain amount of suspicion and the expansion of their acreage carefully regulated. Usually several years must elapse after the release of a new variety before it increases in quantities sufficient to permit widespread planting. This probationary period, by affording time for more extensive observation of the performance of varieties under field conditions, represents an important factor of safety in connection with the introduction of new varieties, and growers should bear in mind that too rapid increase in the acreage of newly released varieties and, in particular, the increasing practice of unauthorized propagation of unreleased varieties, while offering great benefits in the case of a variety which proves satisfactory, is likely to prove very detrimental in the case of apparently suitable varieties, the characteristics of which, as subsequently determined, render them unsuitable for commercial culture.

The results of tests reported in this circular unmistakably confirm previously reported observations to the effect that the more recent introductions, Co. 281, C. P. 807, and Co. 290, have rendered the varieties P. O. J. 36, P. O. J. 213, and P. O. J. 36–M more or less

obsolete and have greatly lessened the importance of P. O. J. 234. The relative performance of Co. 290, both as to indicated yield of sugar per acre and per ton of cane, is of particular interest. The average differences in indicated yield of sugar per acre for plant cane, and for first and second stubble, of over 1,000 pounds as compared with C. P. 807, over 2,200 pounds as compared with Co. 281, and approximately 3,200 pounds as compared with P. O. J. 213, definitely indicate that the per-acre sugar production in Louisiana will be greatly increased as a result of its extensive commercial culture. Its indicated yield of sugar per ton of cane has been higher on the average than corresponding yields from either C. P. 807 or P. O. J. 213. Its low fiber content as compared with other varieties gives this variety an additional milling value.

So far, Co. 290 has not shown any disqualifying pathological or other weaknesses, but it would be dangerous to attempt to estimate its relative value entirely on the basis of field and indicated factory yields so far observed. This variety has proved moderately susceptible to mosaic. The observed percentage of infection has increased from year to year since its introduction and has perhaps not yet reached a level which may be regarded as representative of the variety. Thus, it is possible that slightly lower comparative yields will be obtained as mosaic becomes more widespread within the variety. The decrease from this source alone, however, should not prove sufficient to offset its demonstrated advantage over C. P. 807 in indicated yield of sugar per acre. Co. 290 is classed by Abbott (*1*) as moderately susceptible to red rot under laboratory conditions of artificial inoculation but as resistant under field conditions. In the latter respect, it has proved equal or superior to C. P. 807. Co. 290 has not so far been subjected to unusually severe weather or other conditions which are occasionally experienced in Louisiana. Fortunately for the industry, neither a severe storm, an extremely early freeze, nor high water has occurred since its introduction.

On November 13, 1932, a minimum temperature of 27° F. was observed at Houma. This proved sufficiently severe to kill, in most cases, terminal buds of sugarcane on Sharkey clay areas and in certain instances in fields nearer the streams. Studies indicated that Co. 290 showed less harmful effects from this temperature than did most of the now commercially cultivated varieties. Plant cane of this variety, however, suffered more severe damage than did that of any of the other varieties, as a result of a minimum temperature of 24° on December 15. Co. 290 stubble, which had reached a comparatively higher level of maturity, withstood the effects of the 24° freeze more satisfactorily than did the plant cane. Contrary to expectations, Co. 290, in spite of low average fiber content, has generally shown less damage than other varieties now in cultivation from the moth borer, as borne out by general observation and in studies made by Holloway (*8*) during 1933. This comparative borer resistance, which is a most important quality, could not be correlated with hardness of rind, as measured by the above investigator.

In studies conducted to determine the relative resistance of different varieties to damage from sugarcane beetle, Ingram and others (*9*) reported very satisfactory results with Co. 290, which ranked with C. P. 807 in percentage of survival among damaged shoots. In tests so far conducted, Co. 290 has demonstrated an adaptability to

conditions prevailing on Sharkey clay, and other soils of similar unfavorable agricultural properties, generally equaling or surpassing that of C. P. 807. Its extensive substitution for the latter on such areas, which may ultimately prove justifiable, should be made with caution in view of indications of possibly greater susceptibility to freeze injury, which may develop into a factor of extreme importance under such conditions, due to the comparatively greater exposure to low temperatures. Ease of stripping and favorable milling properties of Co. 290 are points in its favor which should not be overlooked.

The definite indications of early maturity and the high level of vigor and productivity so far demonstrated by C. P. 28/19, as judged on the basis of all information thus far available, are of particular interest to growers in Louisiana. This variety combines properties of early maturity and indicated yield of sugar per ton of cane approximating those of P. O. J. 234 and sugar per acre productiveness equaling or surpassing that of C. P. 807. Such properties, if confirmed by future tests, will unquestionably entitle this variety to a prominent place in commercial cultivation, particularly in view of the widespread dissatisfaction with stubbling qualities of P. O. J. 234, now regarded as the standard early variety. Its extreme susceptibility to *Cytospora sacchari* Butl., a disease which is apparently of no importance with varieties now in commercial cultivation, deserves special mention. As pointed out by Brandes and others (*5*), this disease is an important cause of mortality among suckers with this variety. So far, such losses have been confined to comparatively late suckers, many of which are ordinarily crowded out, and thus losses from this source may be unimportant from a standpoint of ultimate yields. On the other hand, it is conceivable that damage from this disease may, under certain conditions, extend to earlier shoots and thus prove extremely detrimental.

C. P. 28/19, while susceptible to mosaic, as indicated by occasional cases of infection, has so far generally resisted the disease under usual field conditions. Comparative yields are, therefore, based on mosaic-free growth. Whether this cane will ultimately become generally infected, as happened with Co. 281, or whether it will continue to resist mosaic, as has C. P. 807, cannot be definitely predicted. Comparative yield tests with C. P. 28/19 have so far been confined largely to light-soil areas on which plant-cane results indicate widespread adaptability. However, in a single test on heavy soil (Sharkey clay) it produced a higher indicated yield of sugar per acre than was obtained with C. P. 807 and afforded cane of much higher indicated yield of sugar per ton of cane. Information available on limited plantings indicates that this variety possesses extremely satisfactory stubbling qualities. Tests conducted on an experimental basis place this variety approximately on a par with C. P. 807 as to milling qualities and percentage of fiber in cane.

Results of trials of C. P. 28/11 reported herein and in a previous publication (*3*), together with observations on its performance in other trials (not published), show that it gives somewhat lower yields of sugar per ton of cane and of cane per acre than C. P. 28/19. However, its early-maturing quality, which compares favorably with that of P. O. J. 234, and its favorable growth and stubbling qualities, which appear superior to those of P. O. J. 234, indicate that it will surpass the latter in yields of cane and sugar per acre. C. P. 28/11

appears to be definitely less desirable than C. P. 28/19, but it has given comparatively good results and should prove generally suitable for culture in place of P. O. J. 234 until such time as the seed supply of C. P. 28/19 has been sufficiently increased to meet all requirements.

Announcement has been made (*6*) of the formal release of C. P. 28/11 and C. P. 28/19 in the fall of 1934 for commercial culture in Louisiana.

Results obtained with C. P. 807 afford additional evidence of its very satisfactory adaptability, particularly with regard to prolonged stubbling under comparatively unfavorable soil or other conditions making heavy demands on varietal vigor. Indicated yields of sugar per acre obtained, which were on the whole in line with results obtained in previous years, averaged more than 2,000 pounds in excess of corresponding yields from P. O. J. 213 in plant cane, and in first and second stubble. Its indicated yields of sugar per ton of cane observed during 1933 were on the whole somewhat lower than corresponding ones from P. O. J. 213. The general suitability of C. P. 807, as reflected in results of these and of previous tests, was definitely confirmed by extensive plantation plantings harvested during 1933. It has become firmly established as the "black land" (Sharkey clay) cane in parishes east of the Atchafalaya River, while its satisfactory resistance to beetle damage and its comparatively good growth under drought conditions of 1933 were largely responsible for a sharp increase in acreage planted to it during the fall of 1933 in the parishes of St. Mary, Iberia, and Vermilion, located west of the Atchafalaya River. Cane of this variety was milled in considerable quantities in Louisiana during the fall of 1933 with generally satisfactory results, and it is now generally felt that its milling presents no unusual problems in the case of mills equipped with knives ahead of the crusher. Where such equipment is not provided, its usual tangled condition renders an even feed to the mill extremely difficult.

So far, C. P. 807 has generally resisted mosaic, although a few isolated cases have been reported. Abbott (*1*) regards this variety as generally resistant to red rot under field conditions but susceptible to it under artificial inoculation either in the laboratory or in the field. The latter characteristic should be taken as a note of warning by growers, who, as pointed out by Brandes and others (*5*), have generally come to regard C. P. 807 and other new varieties as capable of withstanding all manner of punishment.

Prevailing weather conditions during the spring of 1933 greatly retarded the germination and growth of Co. 281. In spite of resulting growth and maturity disadvantages, this variety afforded generally satisfactory results as compared with the P. O. J. varieties under comparable conditions. Yields of cane and indicated yields of sugar per ton of cane obtained with Co. 281 were, generally and with but few exceptions, consistently higher than corresponding ones from either P. O. J. 213 or P. O. J. 36–M. Its superiority to the latter two varieties was particularly manifest in its more dependable stubbling qualities. The results confirm previous conclusions to the effect that this variety, while affording indicated yields of sugar per ton of cane distinctly higher on the average than corresponding ones of either P. O. J. 213 or P. O. J. 36–M, and occasionally equal or superior to those of P. O. J. 234, does not equal the latter in earliness of maturity and cannot replace it for early milling.

As shown by Balch and Lauritzen (*4*), its erect habit of growth combined with physiological properties which result in comparatively slow deterioration from inversion render Co. 281 a very satisfactory cane for windrowing purposes. Since all other varieties now under commercial cultivation have proved comparatively unsatisfactory for windrowing, this favorable quality in Co. 281 is considered of extreme importance. In most cases, growers are now attempting to include in their plantings a sufficient acreage of Co. 281 to afford cane for much of the late milling, feeling that this variety can readily be windrowed, if necessary, in the event of an anticipated damaging freeze. The factor of safety so introduced is unquestionably of great importance and undoubtedly enhances the utility of this variety out of proportion to its relative value based on sugar productivity alone. Co. 281 did not reveal any symptoms of mosaic for several years after its introduction into Louisiana. Within the past 2 or 3 years the disease has spread freely in cane of this variety, but the percentage of infection has not been uniform, some fields showing practically 100 percent infection and others on the same plantations remaining almost free from it. It has been shown *(11)* that mosaic-infected Co. 281 will yield at the rate of about 20 percent less than mosaic-free cane of the same variety under comparable conditions, and that this variety apparently does not possess the quality of recovering from the disease, thus indicating a greater eventual infection unless control measures such as selection of mosaic-free seed cane are adopted. Since comparative trials with this variety are based on growth under conditions ranging from mosaic-free to varying degrees of infection, somewhat lower relative yields may be expected at such time as the variety may become more widely infected with mosaic.

The prominence of P. O. J. 234 in commercial plantings is due entirely to its property of early maturity. It has been considered almost essential to have a certain acreage devoted to this variety in order to afford cane for early milling. This has been particularly true in the case of growers selling cane under the usual contracts based on the sucrose content of the juice, heavy reductions in the value of cane giving percentages of sucrose below the limits prescribed in contracts for cane of standard quality rendering it extremely undesirable to market cane with low sucrose content. Undesirable stubbling qualities of this variety have not only materially contributed to the generally observed low plantation averages in yield of cane per acre, but its uneven, gappy stands directly account for numerous patches of Bermuda and Johnson grass, which greatly increase cultivation costs.

It would seem that several alternatives, any one or a combination of which may eliminate the need for P. O. J. 234, are now definitely in sight. These include the culture of the early-maturing varieties, C. P. 28/19 (p. 3 and p. 13), and C. P. 28/11 (p. 3); and the possibility of lower topping of high-yielding but comparatively late-maturing varieties for the purpose of bringing up analyses of juice to commercially satisfactory levels. Thus, results of maturity studies show that even early in the season the variety Co. 290 contains comparatively high sugar concentration in lower portions of the stalk and that by eliminating the immature tops a sharp increase in sucrose content of the juice may be obtained. As the result of

the high yields of cane given by this variety it is usually possible to discard the upper portion of the stalks to the extent of 30 percent or more of their weight and still have a greater tonnage of mill cane than that secured from P. O. J. 234 grown under comparable conditions. More extensive utilization of the variety Co. 281, the satisfactory keeping quality of which when stored in windrows for late grinding (p. 33) is an important characteristic, should also prove of value through partly removing the necessity for growing varieties suitable for extremely early grinding.

The results obtained with P. O. J. 213 and P. O. J. 36–M, particularly in stubble crops, indicate rather definitely that these two varieties possess little merit in comparison with others now available for commercial cultivation and that they should receive comparatively little prominence in commercial plantings, if not be entirely abandoned.

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